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ORIGINAL ARTICLES

THE EFFECT OF THE WAR DIET ON THE TEETH AND JAWS OF THE CHILDREN OF VIENNA, AUSTRIA*

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THE etiology of dental caries and malocclusion of the teeth is still obscure, and consequently occupies the most important position in the researches that can be undertaken by members of our profession, as only by a truer knowledge of the etiology can we ever hope to prevent the ravages of dental disease. Prevention should be the aim and object which we have always in view.

It is a lamentable fact that many people enter the dental profession because they consider that it consists only of mechanical processes. The removal of decayed portions of teeth, and their mechanical restoration; the movement of irregular teeth into regular positions by mechanical appliances form so much of the education of the dental student that the infinitely more important work of etiology occupies a very secondary position.

I think that the dental profession is getting out of this rut, and we appreciate the efforts of such men as A. LeRoy Johnson, Hellman, and a few others in placing our own specialty on a more scientific basis.

A considerable amount of attention has recently been drawn to the possibility that the accessory food factors or vitamines may play an important rôle in the causation of caries and maldevelopment of dental tissues. Mrs. May Mellanby of the King's College for Women in London has carried out a series of experiments in the feeding of puppies with food wanting in vitamines and was able to show that the calcification of the teeth was poor, the date of the eruption of the deciduous teeth delayed, the loss of the deciduous, and the eruption of the permanent teeth also delayed, and finally that

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the development of the jaws was such as produced crowding of the teeth especially in the lower incisal region.[1]

Mrs. Mellanby considered that similar conditions might prevail in the mouths of the children in Austria and Poland who have suffered so terribly during and after the war.

The absence of the fat-soluble A vitamine was said to be the cause of the maldevelopment of the teeth and jaws in puppies experimented upon by

Name

No. 590.

Age 5 yrs. 9 months

Diet :—

Date Oct 25 1920

1. First year—Natural, Artificial or Mixed
   If Artificial Nature of Food

Weight 14·2 kg Height Sitting 53 cm.

Handgrip

Including plaster leg splints

2. First to Sixth year

3. Present diet—Breakfast

Lunch

Dinner

Tea

Sweets and Fruit

Character of Mastication (normal, vigorous or feeble)

Maximum pressure between molars, Right — Left

Breathing Normal — Adenoids, etc.

Nose

Lips — Max-pressure

Tongue

Habits—(*a.*) Comforters, etc. — Length of time used

(*b.*) Sucking or biting fingers, etc.

General Health, Illness Rickets. — 1st tooth erupted 2 years old

Cannot stand or walk.

Fig. 1.

Mrs. Mellanby and this vitamine was probably deficient in the diet of Vienna children. It is considered also to have an intimate relation in the causation of rickets.

The fat-soluble A vitamine is especially abundant in milk, butter, eggs, and animal fats, except lard. These foods were almost entirely absent from the diet of the working class children in Vienna. This vitamine is also present in green leaves such as cabbage, lettuce, and spinach which were more plentiful.

It seemed likely that an examination of the Vienna children would give information which might be far-reaching in the etiology of dental diseases.

Somewhat similar work on feeding of animals has been carried out by Howe of Boston; his results suggest that the advent of caries and pyorrhea may also be influenced by a diet deficient in vitamines.[2]

Fig. 2.

In Mrs. Mellanby's experiments of

35 puppies fed on very deficient Fat Sol. "A" diet.	29 showed very irregular teeth. 3 slightly irregular. 3 regular.
5 puppies fed on a somewhat deficient diet	4 had slightly irregular teeth. 1 regular.
19 puppies fed on efficient diet.	4 were slightly irregular. 15 were regular.

i. e., 89 % irregular on deficient diet.
20 % slightly irregular on efficient diet.

I shall now endeavor to show you the results of this investigation and to draw conclusions that may be of importance in the unravelling of the etiology of dental diseases.

In order that the investigation should be of any practical value it was essential that a great many details should be observed, and the examination should be conducted on similar lines to the investigations that have been carried out by other dentists in other countries. The chief points which I decided to investigate were the weight, height, handgrip, form of breathing, general health, condition of gums, developmental defects of teeth, stains, caries, time of eruption of teeth, maldevelopment of jaws, and malocclusion of teeth of children from six months to fourteen years of age.

For this purpose I had charts printed with these headings, and smaller charts for marking hypoplasia of the enamel. (Figs. 1, 2, and 3.) The children to be examined were divided into three groups:

1. Children attending child welfare centres aged six months to six years.
2. Children attending schools aged six years to fourteen years. Both

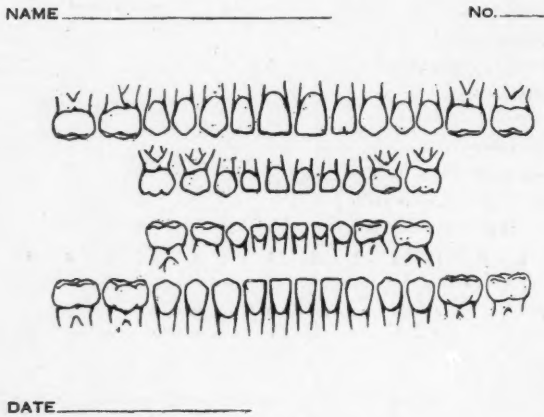

Fig. 3.

these groups are the so-called healthy children of the working classes in Vienna.

3. Children under treatment at one of the hospitals for the effects of under-nourishment, chiefly rickets, aged one year to eight years.

In all about 520 children were examined.

It was impossible to obtain any reliable statistics from the children themselves as to their food during the past six years and one could only find out these statistics in a general way from educated people who had a knowledge of the conditions among all classes in Vienna.

One gathers that previous to the war, meat, butter and whole milk were not very plentiful among the working classes. Coffee, beer, cereals, potatoes and kraut were the staple foods. Fruit in season was very plentiful and was greatly consumed.

Rickets was apparently a very common disease before the war, and a great number of pre-war children showed many manifestations of the disease in the shape of their heads and chests as well as marked hypoplasia of the

teeth of a type that has been associated with rickets. Very few of these cases had had rickets so badly as the majority of the children examined in the hospital.

During the war the fixed rations were

Bread	2 lbs. 12 oz.	per week.
Flour	8¾ oz.	" "

Meat (rationed in 1917) 3½ oz. per week.
Fat, which included butter (very rarely), oil, margarine or lard 4½ oz. per week.

Sugar	1 lb. 10¼ oz.	per month.
Coffee	8¾ oz.	" "

Jam 8¾ oz. to 1 lb. 1½ oz. per six weeks.
Potatoes varied tremendously, often none.
Legumes not rationed until last year and seldom to be had.
Cabbage and turnips not rationed.
Milk—none for adults except the sick.

children 6-14 years	.22 pint	
2- 6 years	.88 "	later reduced to .44 pint.
1- 2 years	.88 "	
under 1 year	1.76 "	per day.

Owing to the scarcity and cost the working classes *very seldom* got these rations of meat, legumes, milk, or butter. They had bread of very poor quality; by this I mean that the bread was made from adulterated flour, and not bread that was made from flour in which was included the whole or part of the offal or outer layers of the seed. Their ration of flour was mostly used for boiled flour puddings. Kraut and turnips were the most plentiful food. War coffee was made out of the rinds of turnips, etc., dried and roasted.

Since the war the food is slightly better. It is more evenly distributed, though still a famine diet.

The official rations consist of:

Bread	2 lbs. 12 oz.	per week.
Flour	1 lb. 1½ oz.	
Fat	4 oz. 3.72 drms.	
Meat	3½ oz.	
Sugar	1 lb. 5 oz.	per month

Milk None except for children.
2-6 years 1 tin of condensed milk per fortnight.
1-2 years 3 tins of condensed milk per week.
Under 1 year 1¼ pints per day.

Coffee, Jam, Potatoes, Kraut, Turnips, Beans — not rationed but very expensive.

Such a diet as this, which has been in vogue for the last five or six years is very much more deficient in fats than that existing in America or England during the same period and one would naturally expect that it would cause great changes in the development of the jaws and teeth and in the amount of caries.

That the deficient diet has had a very large influence in the production of rickets, tuberculosis, and anemia there is no doubt; but there appears to

be no very marked increase of dental diseases or maldevelopment except in one direction.

It was desirable to take the weight and height of the children examined in order to show their general development. The weights and heights of the school children, and of the hospital children were taken, but it was impossible to get it done for the welfare centre children. The weight was very nearly absolute as the children had very little clothes on during the examination. The height taken was the sitting height. Prof. Von Pirquet, who is the head of the Children's Clinic and who is also the Austrian Director of the American Relief Mission, considers that a more reliable criterion can be obtained of a child's development by the relation of the sitting height to the weight, than by the method of comparing the total height to the weight.

When one compares the weights of the children examined with the sta-

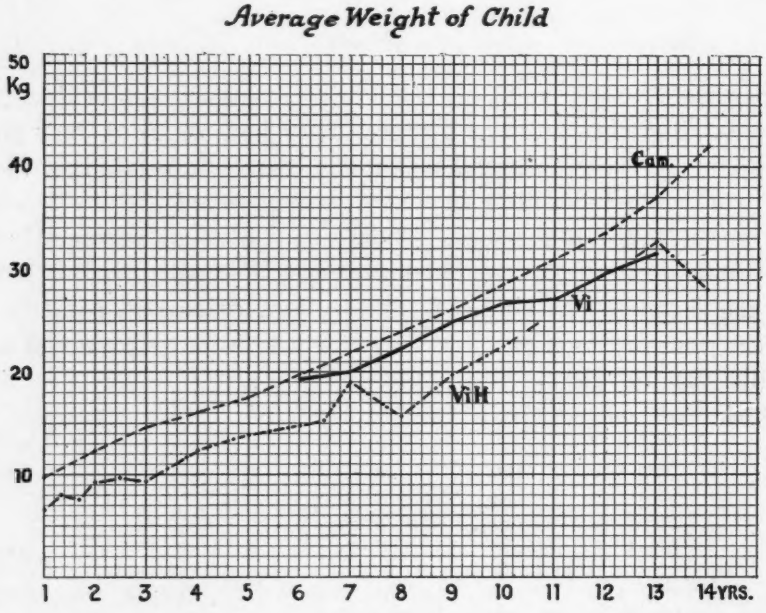

Fig. 4.—The Vienna Welfare Centre children aged 6 months to 6 years and the school children aged 6 years to 14 years are designated as Vi. The Meidling Hospital children aged 1 year to 8 years are designated as ViH. The Statistics of Bunting are designated as Mi. The Statistics of Cunningham are designated as Eng. The Statistics of Camerer are designated as Cam.

tistics of Camerer one sees a very marked difference. They are on an average about 14 pounds underweight and are correspondingly undersized[3] (Fig. 4).

The next series of graphs demonstrate the time of appearance of the deciduous and permanent teeth. In the diagram Fig. 5, I have compared the welfare centre children with the hospital children. The diagram shows the age when 100 per cent of each deciduous tooth was present, and you notice that the eruption of the teeth of the hospital children was very delayed in comparison with the teeth of the welfare centre children.

The next series of graphs, Figs. 6 to 12, demonstrate the percentage of eruption of each permanent tooth at each year. I have compared the school children and the hospital children with the statistics published in the Dental

Cosmos of 1908 giving the result of an investigation carried out by Bunting at Ann Arbor, Michigan.[4] One notices that there is little difference between the times of the eruption of the teeth of the Vienna school children and the Michigan children. The retardation in the eruption of the teeth of the hospital children is more marked.

The next graphs are of the percentage of caries in the deciduous and permanent teeth, and also the premature loss of deciduous teeth.

TABLE I

SCHOOL CHILDREN (VIENNA)

AVERAGE WEIGHTS, HEIGHTS AND HAND-GRIPS

AGE	WEIGHT	HEIGHT	HAND-GRIP RIGHT	HAND-GRIP LEFT	NO. EXAMINED
6 years	19.4 kilograms	60.5 cms.	12 lbs. 1 oz	11 lbs. 3 oz.	37
7 years	20.02 "	63.2 "	14 " 4 "	13 " 1 "	20
8 years	22.4 "	65.2 "	15 " 15 "	14 " 14 "	24
9 years	25.01 "	68.5 "	21 " 6 "	18 " 13 "	35
10 years	26.8 "	70.3 "	22 " 2 "	19 " 6 "	33
11 years	27.2 "	71.5 "	24 " 3 "	21 " 3 "	32
12 years	29.6 "	73.02 "	26 " 9 "	24 " 11 "	35
13 years	31.5 "	73.05 "	28 " 2 "	26 " 12 "	19

TABLE II

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (VIENNA HOSPITAL)
AVERAGE WEIGHTS AND HEIGHTS

AGE	WEIGHT	HEIGHT	NO. EXAMINED
12-16 months	6.77 kilograms	43.42 cms.	7
16-20 months	8.02 "	45.6 "	10
20-24 months	7.83 "	45.87 "	8
2 -2½ years	9.37 "	46.5 "	8
2½-3 years	9.65 "	49.4 "	5
3 -3½ years	9.4 "	46.5 "	4
3½-4 years	10.82 "	49.12 "	8
4 -4½ years	12.43 "	52.5 "	9
4½-5 years	13.15 "	53.33 "	16
5 -5½ years	13.91 "	53.66 "	12
5½-6 years		58.2 "	10
6 -6½ years	14.95 "	54.31 "	8
6½-7 years	15.2 "	54.2 "	5
7 -8 years	19.01 "	59.85 "	8
8 -9 years	15.72 "	57.12 "	4
9 -10 years	19.85 "	64.5 "	2
10 -11 years	22.5 "	65 "	1
13 -14 years	32.8 "	76.33 "	3

In determining the percentage of caries I adopted two methods. In the first place I took the percentage of the total deciduous or permanent teeth present Fig. 15, and in the second place I took the percentage of caries of deciduous teeth of the total deciduous teeth present plus those that were prematurely lost (Fig. 13). The percentage of those that were prematurely lost was of the total deciduous teeth present plus those that were prematurely lost. In the first case one gets the percentage of caries actually present, but in the second case the percentage of caries is slightly smaller, but one can add the percentage of premature loss to it.

It is difficult to determine what constitutes premature loss and it must depend a great deal on individual judgment. If the space left by the deciduous tooth was partially or wholly closed, or if one could neither see nor feel the unerupted permanent tooth or that its eruption was likely not to take place for several months I considered the deciduous tooth prematurely lost. This premature loss I considered one of the most important parts of the investigation because the majority of the severe cases of malocclusion seemed to be a direct result of it.

In the graph Fig. 13 you will notice that the percentage of caries of the deciduous teeth of the school children and welfare centre children of the total present plus lost in each year is considerably lower than that of

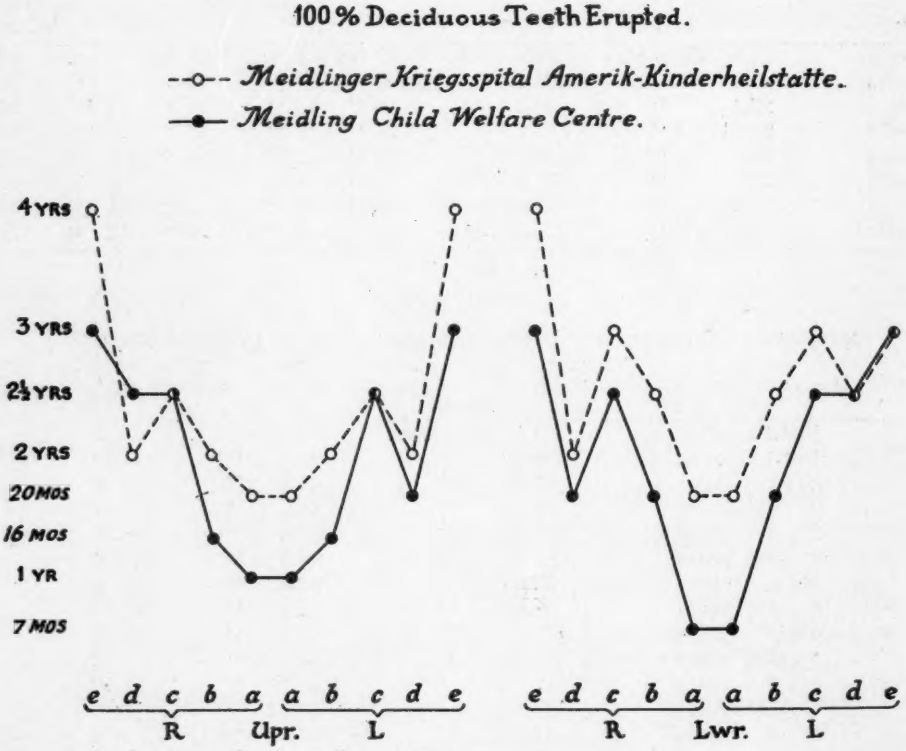

Fig. 5.

the investigation of Cunningham at the Cambridge Dental Institute, England, British Dental Journal, 1905, but when the premature loss is added the curves are very similar. In the other graph, Fig. 14, the percentage of caries of deciduous teeth in the school children and welfare centre children of the deciduous teeth present plus lost is compared with the percentage of caries of the hospital children; the actual caries of the hospital children is somewhat less than in the school children, but the premature loss is very much greater.

Graph Fig. 15 compares the percentage of caries of the total deciduous teeth present of the welfare centre children, and the school children with the hospital children, and with the statistics of Cunningham.

Graph Fig. 16 compares the percentage of loss of the deciduous teeth

of the school children and child welfare centre with the hospital children. The percentage of loss of the hospital children is very much greater, and one can imagine the tremendous drifting of the remaining teeth. I shall refer to this matter later.

The graph demonstrating the percentage of caries of the permanent teeth shows that the Vienna school children and hospital children had a very much lower percentage than the English children.

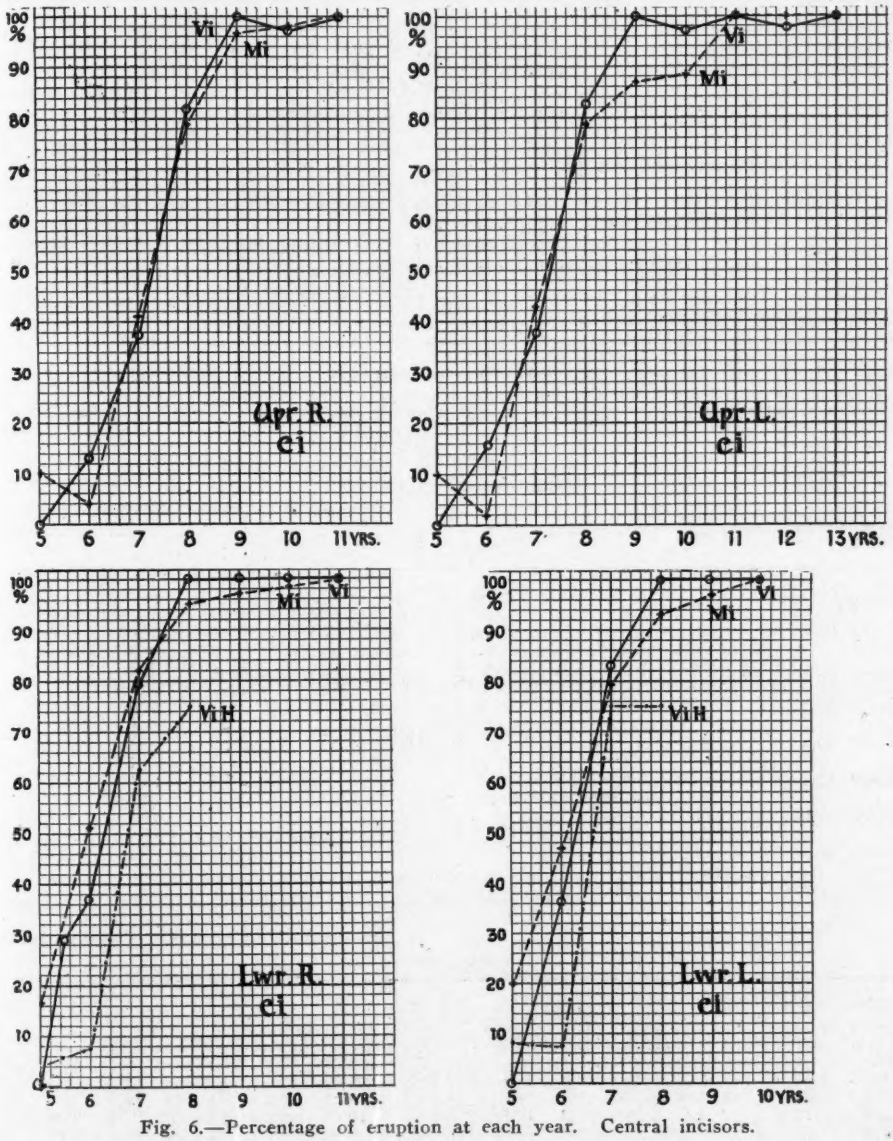

Fig. 6.—Percentage of eruption at each year. Central incisors.

In examining the teeth for caries one noticed in the very badly nourished children that they were very liable to a cervical caries of the deciduous teeth.

The children of the hospital who had very bad rickets had frequently very unhealthy gums. Not only a marginal gingivitis but the whole gum was inflamed (Fig. 17).

Where the deciduous teeth were falling out prematurely the teeth were greatly stripped, i.e., recession of the gum, and a large amount of the root was not absorbed. There seemed to be no very great discharge from the

TABLE III

MEIDLING CHILD WELFARE CENTRE, VIENNA

PERCENTAGE OF TEMPORARY TEETH PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	20	20	40	20	...	...	...
	...	...	...	66.66	100	100	50	...	...	...
	...	73.33	33.4	100	100	100	100	33.33	80	...
	...	100	...	100	100	100	100	...	100	...
	40	80	60	100	100	100	100	60	100	40
	71.4	100	100	100	85.71	85.71	100	100	100	71.42
Prematurely lost	...	...	...	...	14.2	14.2	...	...	...	...
	100	100	100	100	100	100	100	100	100	100
	100	100	100	100	100	100	100	100	100	100
Prematurely lost	...	...	...	...	...	...	...	...	...	...
	100	100	100	100	100	100	100	100	100	100
Prematurely lost	...	...	...	...	...	...	...	...	...	...

PERCENTAGE OF PERMANENT TEETH PRESENT OF TOTAL CASES EXAMINED IN EACH YEAR

UPPER JAW

VI	V	IV	III	II	I	I	II	III	IV	V	VI
8.5	...	...	...	...	...	...	...	...	...	...	5.7

TABLE IV

VIENNA SCHOOL CHILDREN

PERCENTAGE OF TEMPORARY TEETH PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	100	86.8	100	84.3	79	76.3	92.2	100	94.8	100
Prematurely lost	...	13.2	...	13.2	7.9	7.9	7.9	...	5.2	...
	100	91.6	95.8	70.9	45.9	37.5	66.7	91.6	79.2	87.5
Prematurely lost	...	8.3	4.1	12.5	16.7	25	12.5	8.3	8.3	8.3
	69.6	65.2	100	30.4	13.1	17.4	52.2	87	65.2	82.6
Prematurely lost	21.8	13.1	...	17.4	4.3	...	...	13.1	21.8	13.1
	77	86.7	89.8	7.7	...	...	7.7	87.2	56.5	77
Prematurely lost	12.8	10.2	5.1	12.8	...	...	7.7	7.7	12.8	10.3
	50	38.9	69.5	5.5	2.7	...	2.7	66.1	38.9	52.8
Prematurely lost	13.9	5.5	5.5	5.5	...	2.7	5.5	19.5	2.7	16.7
	37.2	14.3	42.9	...	...	...	...	42.9	14.3	31.4
Prematurely lost	...	5.7	22.9	2.8	...	...	...	28.6	2.8	2.8
	19.5	9.7	31.7	2.4	...	2.4	2.4	36.6	7.3	9.7
Prematurely lost	4.8	...	12.2	...	...	...	...	12.2	2.4	4.8
	8.3	8.3	33.4	...	...	...	...	37.5	8.3	8.3
Prematurely lost	4.1	4.1	...	...	...	...	...	...	...	4.1

PERCENTAGE OF PERMANENT TEETH PRESENT OF

UPPER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII
...	55.3	...	...	...	2.6	13.2	15.8	...	...	...	...	50	...
...	83.3	...	...	...	16.7	37.5	37.5	20.9	...	12.5	4.17	75	...
...	100	8.7	21.8	...	52.2	82.7	82.7	47.8	...	21.8	4.35	100	...
...	97.5	12.8	23.1	5.1	79.5	100	100	84.6	5.1	30.8	18	97.5	...
2.7	100	36.1	58.3	25	89	97.2	97.2	91.7	19.5	66.7	30.6	100	...
2.8	100	65.7	83	34.3	97.2	100	100	100	28.6	85.8	71.5	100	8.5
29.3	100	78.1	90.3	56.1	97.6	100	97.6	97.6	51.2	90.3	90.3	100	29.3
66.7	100	87.5	87.5	66.7	100	100	100	95.8	58.3	91.7	87.5	91.7	62.5

gums, but what there was, was of a serous form. Many cases were seen where only four or six deciduous molars were left standing.

Lawson Dick in his book on "Defective Housing and the Growth of Children" calls special attention to the amount of hypoplasia present of the type which has been associated with rickets. He considers that only

some condition of very long standing could produce such large hypoplastic areas. A fever might produce hypoplasia, but it would be in the form of a line, or line of pits, whereas rickets produces a large honeycombed area

TABLE III—CONT'D

PREMATURE LOSS OF TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

e	d	c	b	a	a	b	c	d	e	AGE	NO. EXAMINED
...	...	...	20	100	100	20	...	...	...	7-12 mths.	5
...	...	...	50	100	100	50	...	...	...	12-16 "	6
...	80	33.33	93.33	100	100	80	33.33	80	...	16-20 "	15
...	100	...	100	100	100	100	...	100	...	20-24 "	2
60	80	60	100	100	100	100	60	60	40	2 -2½ yrs.	5
71.42	100	100	100	100	100	100	100	100	71.42	2½-3 "	7
...	...	...	...	...	...	...	...	...	...		
100	100	100	100	100	100	100	100	100	100	3 -4 "	18
95.6	100	100	100	100	100	100	100	100	100	4 -5 "	23
4.3	...	...	...	...	...	...	...	...	...		
97.1	97.1	97.1	100	91.4	91.4	97.1	97.1	97.1	94.2	5 -6 "	35
2.8	2.8	2.8	...	...	...	2.8	2.8	2.8	5.7		

LOWER JAW

VI	V	IV	III	II	I	I	II	III	IV	V	VI	AGE	NO. EXAMINED
8.5	...	...	...	...	8.5	8.5	...	...	...	...	8.5	5-6 years	35

TABLE IV—CONT'D

PREMATURE LOSS OF TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

e	d	c	b	a	a	b	c	d	e	AGE	NO. EXAMINED
92.2	94.8	100	84.3	57.9	57.9	79	100	97.4	97.4	6 years	38
7.9	5.2	...	...	5.2	5.2	.2	...	2.6	2.6		
83.4	83.4	91.6	66.7	20.8	16.7	66.7	95.8	83.4	66.7	7 "	24
16.7	16.7	4.1	4.1	...	...	4.1	4.1	16.7	33.4		
74	87	95.8	13.1	...	...	13.1	91.3	78.3	56.5	8 "	23
26.1	13.1	4.3	...	...	...	...	...	17.4	43.5		
53.9	59	74.4	2.5	...	...	2.5	79.6	71.8	43.6	9 "	39
33.4	25.6	10.3	...	...	...	...	5.1	7.7	43.6		
55.6	47.3	41.7	...	...	...	...	47.3	58.3	50	10 "	36
25.	13.9	5.5	...	...	...	...	5.5	8.3	30.6		
25.7	17.2	31.4	...	...	...	...	25.7	25.7	14.3	11 "	35
34.3	20	5.7	...	...	...	...	8.5	22.9	51.5		
17.1	9.7	14.7	...	...	...	...	19.5	14.7	17.1	12 "	41
24.4	7.3	...	...	...	...	...	...	7.3	24.4		
8.3	8.3	12.5	...	...	...	4.1	16.7	8.3	8.3	13 "	24
12.5	4.1	...	4.1	...	...	...	...	8.3	20.9		

TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII	AGE	NO. EXAMINED
...	50	...	...	...	15.8	36.8	36.8	15.8	...	...	...	60.5	...	6 yrs.	38
...	75	...	...	4.1	29.2	79.2	83.3	29.2	...	...	...	83.3	...	7 "	24
...	100	...	...	...	87	100	100	87	8.7	8.7	...	95.7	...	8 "	23
2.57	97.5	12.8	18	15.4	97.5	100	100	97.5	15.4	20.5	15.4	97.5	...	9 "	39
5.5	100	25	44.5	52.8	100	100	100	100	47.3	33.4	19.5	100	8.3	10 "	36
31.4	100	45.7	62.9	62.9	100	100	100	100	65.7	54.3	34.3	100	25.8	11 "	35
43.9	100	63.4	85.4	85.4	100	100	100	100	80.6	80.6	61	100	46.4	12 "	41
75	100	79.2	87.5	87.5	95.8	100	100	100	87.5	83.3	70.8	100	75	13 "	24

or a condition as if the ends of the teeth had been half eaten by some animal. The majority of hypoplasia in the permanent teeth, which I saw, was of this nature. In the deciduous teeth it took the form of pitting or honeycombing.

Very little hypoplasia was to be seen in the teeth of the welfare centre

children, about 3.4 per cent. In the hospital children about 5.9 per cent and in the school children about 28.4 per cent. Fifty per cent of these latter had hypoplasia of the deciduous teeth and 82 per cent had hypoplasia of the permanent teeth. One must remember that the majority of the hypoplasia of the deciduous teeth must have occurred before birth between the fifth and ninth month of intrauterine life, and that it was prob-

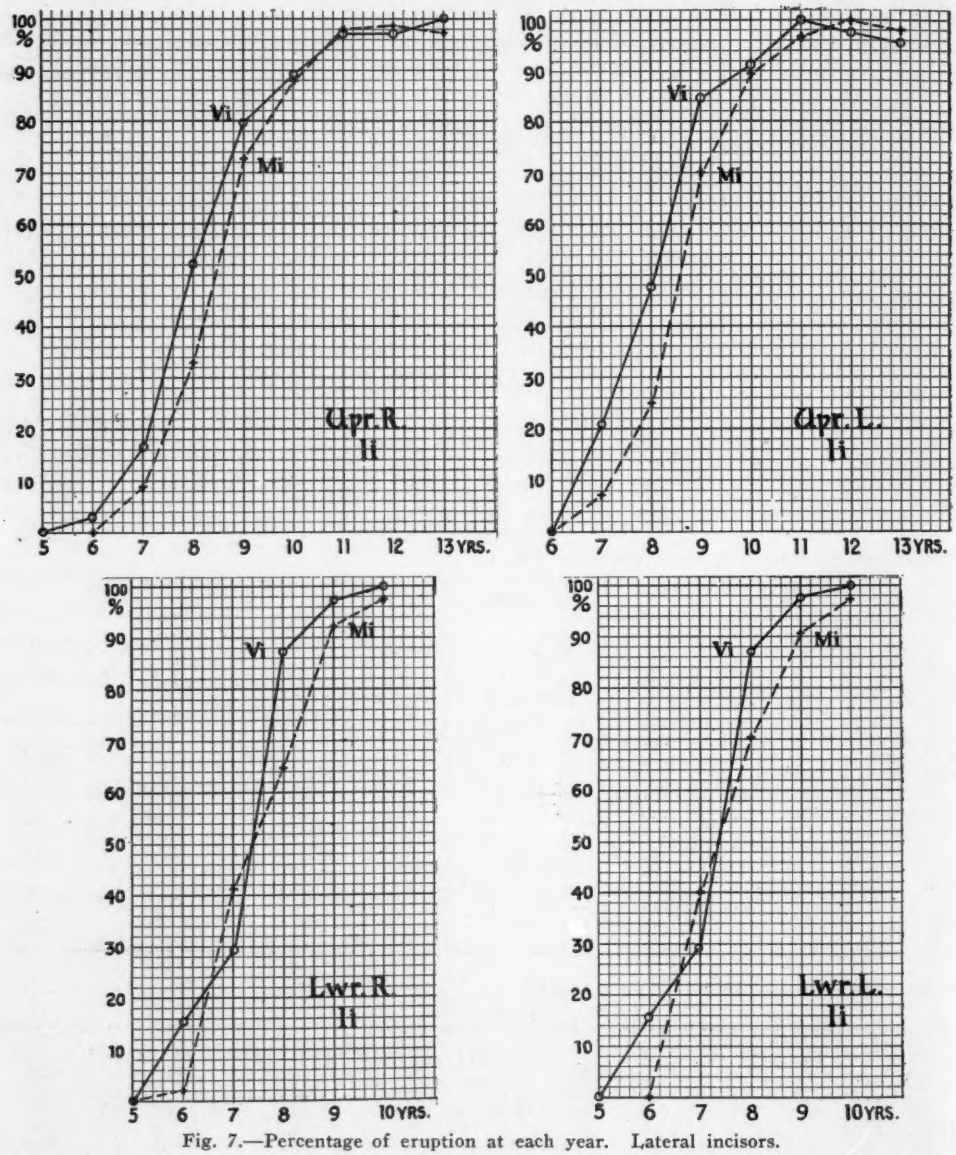

Fig. 7.—Percentage of eruption at each year. Lateral incisors.

ably the result of the undernourishment of the mother, whereas the hypoplasia of the permanent teeth nearly always occurred after birth.

Lawson Dick also attaches importance to the "white patches" frequently seen on children's teeth which are probably due to some form of faulty calcification. In the Vienna children the percentage of children that had white patches was 5 per cent child welfare, 13.2 per cent school children, and 7.4 per cent hospital children. Lawson Dick gives the percentage

of the children he examined as 28.5 per cent. In many of the cases where "white patches" were seen they occurred on single teeth. It is difficult to account for their presence especially in the deciduous denture.

A considerable amount of brown and green stains, especially around the cervical margins, were seen which are probably due to some action of Cromogenic bacteria. I think the Brown striae of Retzius said to have

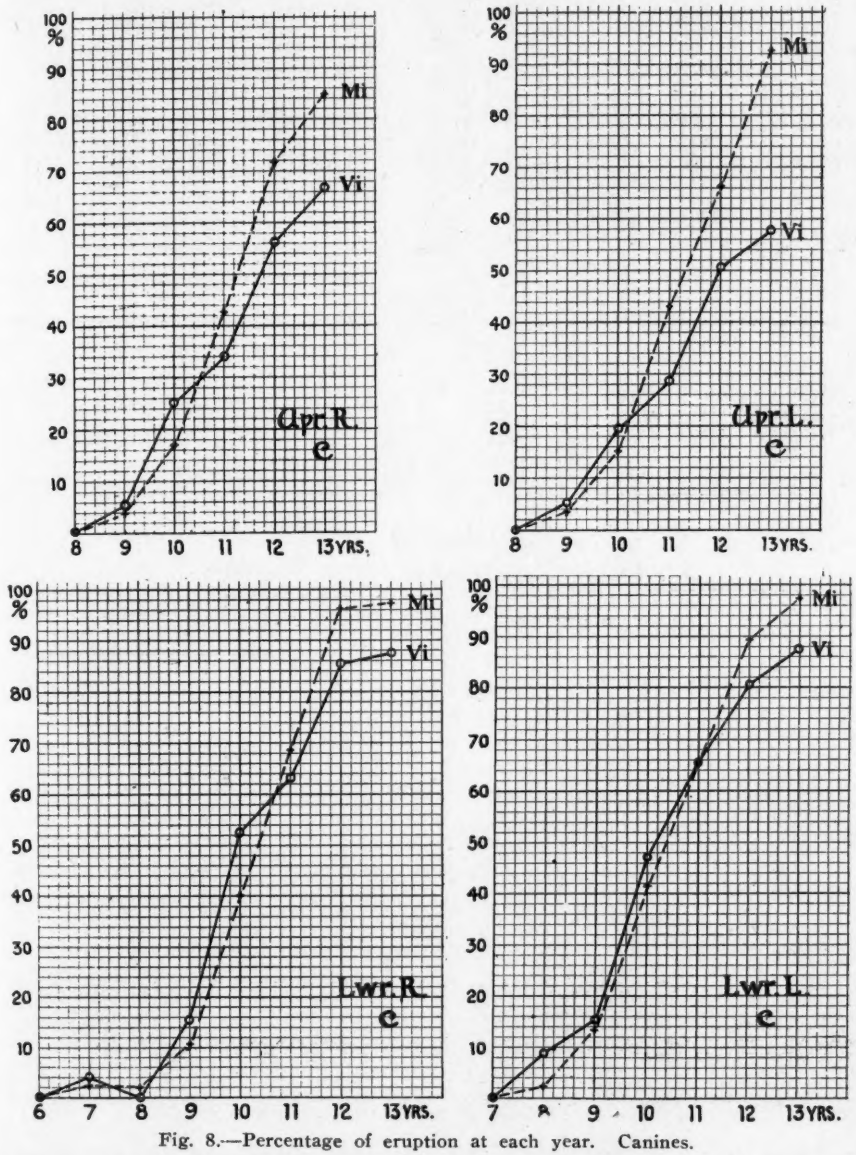

Fig. 8.—Percentage of eruption at each year. Canines.

been seen by Lawson Dick was really these stains, as I do not think the striae of Retzius can be seen except in sections and magnified by the microscope. According to Norman Bennett the striae are more marked in hypoplastic teeth, but Hopewell-Smith considers the reverse is the case.

The last part of the investigation and the part which is of most interest to our specialty is the most difficult to describe.

That is the maldevelopment of jaws, and the malocclusion of the teeth.

TABLE V

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (HOSPITAL CHILDREN VIENNA)

PERCENTAGE OF TEMPORARY TEETH PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	50	75	75	50	...	12.5	...
	...	50	8.3	66.6	91.6	91.6	66.6	8.3	50	...
	...	50	12.5	87.5	100	100	87.5	12.5	50	...
	12.5	100	50	100	100	100	100	50	100	12.5
	83.3	100	100	100	100	100	100	100	100	83.3
Present	93.7	100	87.5	87.5	87.5	81.2	81.2	100	100	93.7
Prematurely lost	...	...	6.2	12.5	12.5	18.7	18.7	...	...	...
Present	96.1	100	84.6	88.4	88.4	88.4	92.3	84.6	100	100
Prematurely lost	...	...	15.3	11.5	11.5	11.5	7.6	15.3	...	...
Present	96	88	88	88	84	80	88	84	92	96
Prematurely lost	4	12	12	12	16	20	12	16	8	4
Present	100	76.9	100	69.2	30.7	38.4	69.2	100	76.9	100
Prematurely lost	...	23.1	...	30.7	69.2	61.5	30.7	...	23.1	...
Present	100	100	100	100	62.5	62.5	87.5	100	87.5	100
Prematurely lost	...	...	...	...	25	25	...	...	12.5	...
Present	100	100	50	25	...	...	25	25	75	100
Prematurely lost	...	...	50	25	75	75	25	75	25	...

PERCENTAGE OF PERMANENT TEETH PRESENT OF

UPPER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII
...	8	...	...	...	...	...	...	...	...	...	...	8	...
...	23.1	...	...	...	...	...	...	...	...	...	...	15.3	...
...	75	...	...	...	...	12.5	12.5	12.5	...	...	...	75	...
...	50	...	...	...	50	25	25	50	...	...	...	50	...
...	100	...	...	...	100	100	100	100	...	100	...	100	...
...	100	...	...	...	100	100	100	100	...	...	...	100	...
66.6	100	100	100	100	100	100	100	100	100	100	100	100	100

TABLE VI

MEIDLING CHILD WELFARE CENTRE (VIENNA)

PERCENTAGE OF CARIES OF TOTAL ACTUALLY PRESENT AND

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...
Caries	...	...	...	...	6.6	6.6	6.6	...	...	...
	...	...	...	...	...	...	...	...	...	...
Caries	...	9	...	8.3	...	...	8.3			
Prematurely lost	...	...	...	...	8.3	8.3	...	...	...	...
Caries	...	5.5	5.5	...	11.1	11.1	...	5.5	5.5	...
Caries	17.3	13	4.3	8.7	13	26.1	8.7	4.3	17.3	17.3
Prematurely lost	...	...	...	...	...	...	...	...	...	...
Caries	22.8	28.5	8.5	25.7	42.8	40	22.8	2.8	34.2	20
Prematurely lost	...	...	...	...	...	...	...	...	...	...
Total percentage of Caries in each tooth for all ages	14.4	15	5.4	10.9	18.9	19.6	11	3.3	16.6	13.2
Total percentage of loss in each tooth for all ages					.9	.8				

I have tried to show you that the children were poorly developed, that the eruption of the teeth was delayed, and that the deciduous teeth were lost prematurely. Was there any type of malocclusion present that it could be definitely stated was the result of the diet?

Mouth breathers were exceedingly rare and there were *few* cases of Class II, Div. I, (Angle) that I thought were sufficiently marked to warrant treatment.

I saw no cases of jaws or teeth that were similar to the case shown

TABLE V—CONT'D

PREMATURE LOSS OF TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

e	d	c	b	a	a	b	c	d	e	AGE	NO. EXAMINED
...	...	...	25	75	75	12.5	...	...	...	12-16 mths.	8
...	41.6	...	58.3	91.6	83.3	66.6	...	33.4	...	16-20 "	12
...	37.5	12.5	75	100	100	75	12.5	37.5	...	20-24 "	8
25	100	37.5	87.5	100	100	87.5	50	87.5	37.5	2 -2½ yrs.	8
83.3	100	83.3	100	100	100	100	83.3	100	83.3	2½-3 "	6
93.7	100	100	100	100	100	100	93.7	100	100	3 -4 "	16
...	...	...	...	...	...	...	5.2	...	...		
100	96.1	84.6	92.3	84.6	84.6	96.1	88.4	100	100	4 -5 "	26
...	3.8	15.3	7.6	15.3	15.3	3.8	11.5	...	...		
84	88	96	92	80	72	92	92	88	84	5 -6 "	25
16	12	4	8	16	20	8	8	12	16		
92.3	46.1	84.6	76.9	53.8	61.5	69.2	61.5	61.5	92.3	6 -7 "	13
7.6	53.8	15.3	23.1	38.4	30.7	30.7	38.4	38.4	7.6		
100	75	100	75	25	25	62.5	100	87.5	75	7 -8 "	8
...	25	...	12.5	12.5	...	25	...	12.5	12.5		
50	50	50	25	...	...	25	50	50	50	8 -9 "	4
50	50	50	25	25	25	25	50	50	50		

TOTAL CASES EXAMINED IN EACH YEAR

LOWER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII	AGE	NO. EXAMINED
...	8	...	...	...	...	4	8	...	...	...	...	8	...	5- 6 yrs.	26
...	30.7	...	...	...	...	7.6	7.6	...	...	...	...	30.7	...	6- 7 "	13
...	75	...	...	...	12.5	62.5	75	12.5	...	...	12.5	87.5	...	7- 8 "	8
...	50	...	...	...	50	75	75	50	...	...	...	75	...	8- 9 "	4
...	100	100	100	...	100	100	100	100	...	...	...	100	...	9-10 "	1
...	100	...	...	...	100	100	100	100	...	...	100	100	...	10-11 "	1
100	100	100	100	100	100	100	100	100	100	100	100	100	100	13-14 "	3

TABLE VI—CONT'D

PREMATURE LOSS OF TOTAL PRESENT + LOST IN TEMPORARY TEETH

LOWER JAW

e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE OF CARIES AND LOSS IN ALL TEETH FOR EACH YEAR	AGE	NO. EXAMINED
...	...	...	...	...	...	...	...	...	...		7-12 mths.	5
...	...	...	...	...	...	...	...	...	...		12-16 "	6
...	...	...	...	...	...	...	...	...	...	1.6	16-20 "	15
...	...	...	...	...	...	...	...	...	...	...	20-24 "	2
12.5	...	...	...	8.3	8.3	8.3	...	...	14.2	3.8	2 years	12
...	...	...	...	...	...	...	...	...	...	.95		
44.4	38.8	...	...	...	...	...	...	27.7	50	10.2	3 years	18
36.3	47.8	...	4.3	4.3	4.3	4.3	...	34.7	43.4	15.2	4 years	23
4.3	...	...	...	...	...	...	...	...	...	.21		
64.7	55.8	2.9	...	...	...	...	2.9	47	69.6	24.6	5 years	35
2.8	2.8	2.8	...	...	...	2.8	2.8	2.8	5.7	1.1		

47.5	37	1.1	.9	1.7	1.7	1.9	1.1	29.2	53.1	14.5	Total percentage of Caries found in all teeth for all ages.
2.3	.9	1.08	...	...	...	.9	1.08	1	2.4	.55	Total percentage of Premature Loss in all teeth for all ages.

in Dewey's Practical Orthodontia, page 120, fourth edition, as the result of rickets. I think the fact has been overlooked that the deformity produced in bones by rickets is not caused by the pull of the muscles but by the weight above the part such as that seen in the long bones of the legs or in the long bones of the arms. In both cases it is produced by the weight of the trunk during either walking or crawling.

One must also remember that the muscles become weak and flabby and that possibly some of the chest deformities are due to the want of tone of

the chest muscles so that they are not able to counteract the elasticity of the ribs.

A couple of cases of open-bites were seen that were the nearest resemblance to the so-called rickety jaw, but the open bite was very slight. This bears out Hatfield's examination.[6] The main malocclusion of a serious nature which I saw was the result of premature loss of deciduous teeth. Again,

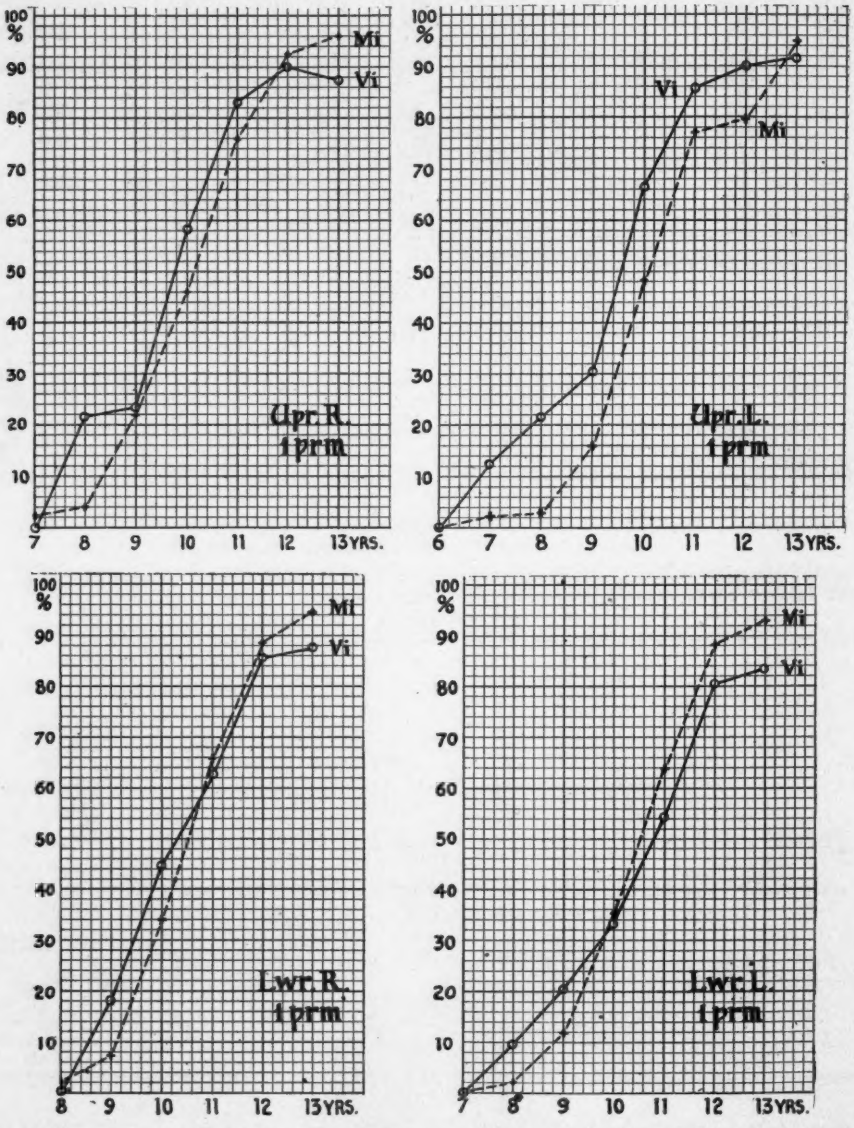

Fig. 9.—Percentage of eruption at each year. First Premolars.

like the premature loss, the diagnosis of the malocclusion was a matter of individual judgment. Owing to certain conditions it was found impossible to obtain impressions of the children's mouths, and I had to form my opinion of the cause of the malocclusion when seeing the child.

The children to whom I wish particularly to draw your attention are those under six years of age. They are the children whose whole lives have

been affected by the war diet. If any malocclusion were present it would be of the deciduous teeth as so few permanent teeth were erupted.

I will first bring to your notice the welfare centre children—121 children were examined. Thirteen, or 10.7 per cent, cases of malocclusion were seen, all Class I cases (Angle's classification). In two of these cases the malocclusion was due to abnormal attachment of the frenum causing

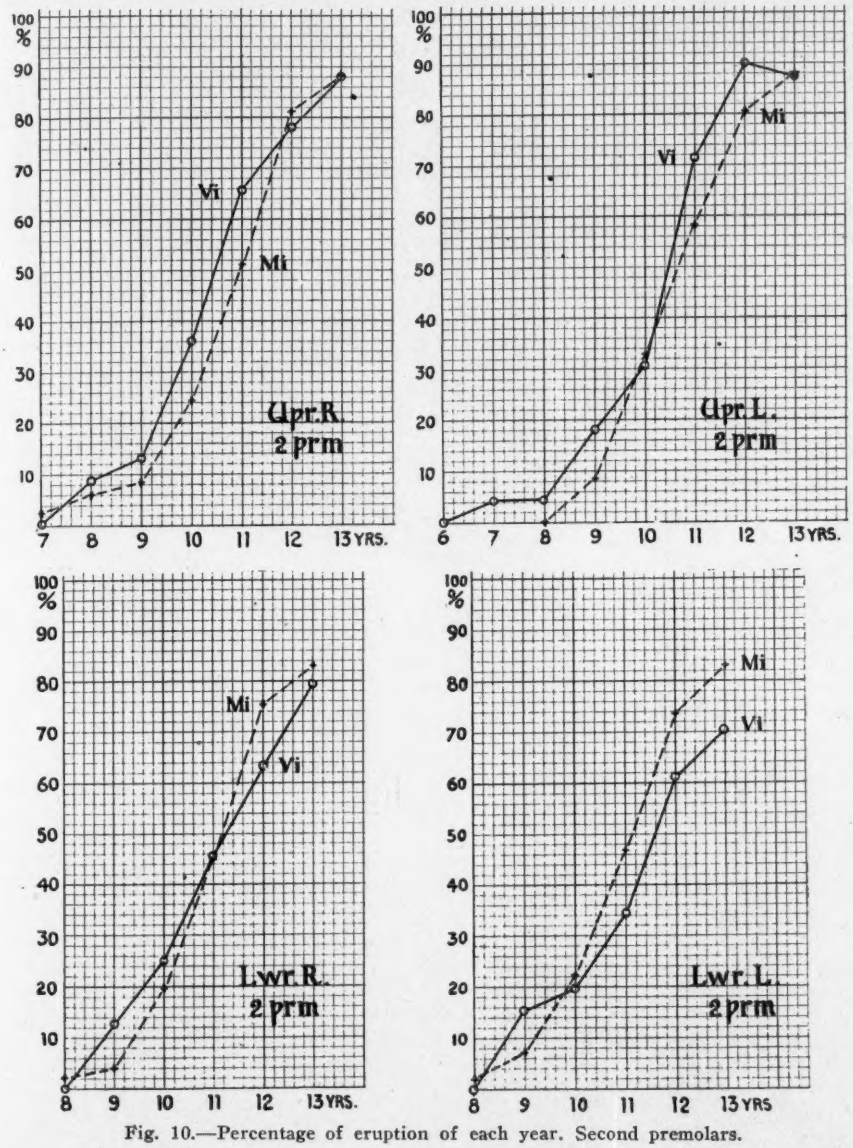

Fig. 10.—Percentage of eruption of each year. Second premolars.

separation of the central incisors. In one case it was due to a supernumerary lateral incisor in lingual occlusion. In three cases there was slight protrusion of maxillary incisors due to thumb sucking. In one case there was slight protrusion of maxillary incisors due to mouth breathing, no history of thumb-sucking. In the remaining six cases the malocclusion consisted of very slight crowding of the incisors chiefly rotation of mandibular central incisors with the mesial angles lingual.

In all these cases the malocclusion was insignificant and in no case was there maldevelopment of the jaws.

The premature loss of deciduous teeth with these children was relatively small .55 per cent. Most of these children had rickets to a small degree.

The condition of the hospital children was very different. The premature loss of deciduous teeth amounted to 9.8 per cent. The number of children examined was 134 aged one year to eight years. Thirty-three cases,

TABLE VII

SCHOOL CHILDREN (VIENNA)

PERCENTAGE OF CARIES OF TOTAL ACTUALLY PRESENT AND PREMATURE

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
Caries	42.4	33.4	18.4	25	40	34.5	28.6	13.2	47.2	42.1
Prematurely lost	...	13.2	...	13.5	9.1	9.4	7.8	...	5.3	...
Caries	58.3	50	17.4	41.2	45.5	33.4	43.8	18.2	52.7	57.1
Prematurely lost	...	8.3	4.1	15	26.7	40	15.8	8.3	9.5	8.7
Caries	62.5	60	17.4	...	...	...	...	10	60	84.2
Prematurely lost	23.8	16.7	...	36.4	25	...	...	13.1	25	13.7
Caries	70	34.6	11.4	...	...	...	...	26.5	59.1	80
Prematurely lost	14.3	13.3	5.4	62.5	...	...	50	8.1	18.5	11.8
Caries	55.5	21.4	8	...	...	...	100	13.6	42.8	52.6
Prematurely lost	21.8	12.5	7.41	50	...	100	66.7	24.2	6.6	24
Caries	61.5	80	26.7	...	...	...	...	40	80	100
Prematurely lost	...	28.5	34.8	100	...	...	...	40	16.6	8.3
Caries	62.5	75	38.4	...	...	...	...	20	66.8	75
Prematurely lost	20	...	27.7	...	...	..	...	25	25	33.4
Caries	100	100	37.5	...	...	...	...	33.4	100	50
Prematurely lost	33.4	33.4	...	...	...	...	...	...	...	33.4
Total percentage of Caries in each tooth from 6-14 years	59.1	43	18.3	24.2	37.8	30.3	26.5	20	54.3	64.6
Total percentage of premature loss in each tooth from 6-14 years	10.8	13.6	9.1	24.4	15.1	18.9	13.9	14.6	11.5	11.7

PERCENTAGE OF CARIES FOUND IN EACH PERMANENT TOOTH

UPPER JAW

	VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII
	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	...	25	...	...	...	...	...	...	...	...	33.4	...	16.7	...
	...	34.8	...	20	...	...	...	...	...	...	...	...	34.8	...
	...	42.1	...	...	...	...	...	...	...	...	...	...	34.3	...
	...	36.1	...	...	...	...	2.8	...	...	...	...	...	31.5	...
	...	37.2	...	10.4	...	...	2.8	2.8	2.8	...	6.6	...	22.9	...
	...	63.4	9.3	5.4	...	7.5	14.6	10	12.5	...	8.1	8.1	61	...
	6.25	70.8	...	9.5	...	4.1	16.7	16.7	4.3	...	4.5	23.8	59.1	13.4
Total percentage in each tooth from 6-14 years	3.3	41.2	3.1	6.5	...	2.2	5.8	4.3	3.8	...	5.2	7.7	34.9	6.6

or 25 per cent, of malocclusion were seen, sometimes accompanied by maldevelopment of the jaws. Fifteen cases, or 11.6 per cent, were the result of premature loss of deciduous teeth. Of the latter 10 or 11 cases came under Class I and 4 or 5 cases under Class III. In each of the five cases there had been an extensive loss of anterior deciduous teeth.

The greatest number of these cases of malocclusion occurred in children

aged five or six years, one case occurred at the age of three years, two at four years, and one at eight years.

The deformity in some cases was very great.

The 18 cases where the malocclusion was not due to premature loss were classified as follows:

15 under Class I.
1 under Class II, Div. I.
2 under Class III, (one of these possibly a wrong bite).

TABLE VII—CONT'D

LOSS OF TOTAL PRESENT + LOST FOUND IN EACH TEMPORARY TOOTH

LOWER JAW

e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE IN ALL TEETH FOR EACH YEAR	AGE	NO. EXAMINED
68.6	55.6	13.2	12.5	4.5	9.1	13.3	7.9	75.7	81.1	34.9	6 years	38
7.9	5.3	..	..	8.3	8.3	6.3	..	2.6	2.6	4.5		
70	70	9.1	6.3	..	25	6.3	4.4	70	81.3	39.9	7 years	24
16.7	16.7	4.35	5.9	..	..	5.9	4.1	16.7	33.4	12.4		
82.4	70	9.1	..	..	..	..	4.8	55.5	76.8	40.3	8 years	23
26.1	13.1	4.3	..	..	..	..	..	18.2	43.5	16.1		
76.2	65.2	3.4	..	..	..	..	6.4	57.2	76.5	42.8	9 years	39
38.2	30.3	12.1	..	..	..	..	6	9.6	50	19.3		
70	53	20	..	..	..	..	5.8	52.4	72.2	38.4	10 years	36
31.1	22.8	11.8	..	..	..	..	10.5	12.5	37.9	21.2		
66.7	66.7	36.4	..	..	..	..	33.4	88.9	60	57.5	11 years	35
57.1	53.8	15.4	..	..	..	..	25	47	78.2	38.3		
57.1	75	..	..	..	..	..	25	33.4	85.7	43.2	12 years	41
58.8	42.8	..	..	..	..	..	..	33.4	63.1	31.8		
100	50	..	..	..	..	..	..	..	100	32.2	13 years	24
60	33.4	..	100	..	..	..	..	50	71.4	26.8		
71.8	62.5	11.6	32.9	3.7	11.5	9.8	8.6	63.1	78.3	39.8	Total percentage of Caries found in all teeth for all ages.	
31.4	21.5	6.5	3.7	6.9	7.1	5.6	5	16.6	41	16.1	Total percentage of premature loss in all teeth for all ages.	

LOWER JAW

VII	VI	V	IV	III	II	I	I	II	III	IV	V	VI	VII	TOTAL PERCENTAGE IN ALL TEETH FOR EACH YEAR	AGE
...	15.8	...	...	...	...	...	...	...	...	...	...	26.1	...	6.7	6 yrs.
...	38.9	...	...	...	...	...	...	...	...	...	...	35	...	14.3	7 "
...	56.5	...	...	...	...	...	...	...	...	...	...	50	...	16.1	8 "
...	80	...	...	...	...	...	...	...	...	...	16.7	65.8	...	15.9	9 "
...	72.2	...	...	...	...	...	...	...	...	...	...	66.7	...	12.6	10 "
...	82.9	...	...	...	5.7	5.7	5.7	2.8	4.3	...	8.3	82.9	...	14	11 "
...	83	15.4	5.7	...	...	...	...	...	...	3	4	90.3	5.3	17.6	12 "
22.2	87.5	...	4.7	4.7	4.3	4.1	4.1	4.1	...	5	17.7	91.6	38.9	19.7	13 "
12	68.8	5.3	2.9	.96	1.46	1.3	1.3	.97	.98	2.13	8.95	67.3	16.4	15.6	Total percentage of Caries found in all teeth for all ages.

The malocclusion in the Class I cases consisted of slight crowding of incisors in nine of the children, one case had a marked over-bite of the incisors, one case had an open bite due to sucking fingers, and two other cases had open bite which did not extend further back than the canines. The remaining two Class I cases had lingual occlusion of the maxillary central incisors in one case and one maxillary central in the other.

Again in all these cases the malocclusion was very slight and there was no maldevelopment of the jaws.

The Class II, Div. I case was very slight.

One of the Class III cases I thought was a wrong bite but I could not succeed in getting any other.

The other case had slight crowding of maxillary and mandibular in-

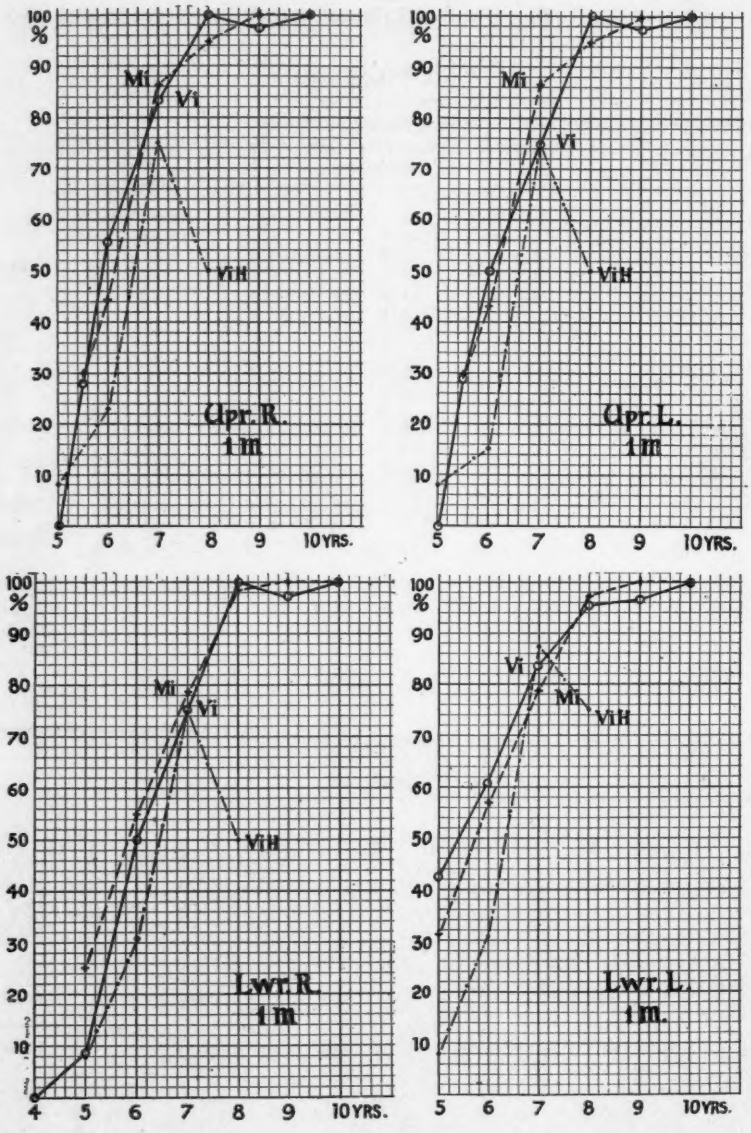

Fig. 11.—Percentage of eruption at each year. First premolars.

cisors, labial occlusion of $\overline{c, b|}$ and edge to edge occlusion of $\left|\frac{b\ c}{b\ c}\right.$ and mesial relation of lower jaw and molars.

It does not seem to me that there is an abnormal percentage of malocclusion among either of these two groups of children, except that due to premature loss of deciduous teeth.

The child welfare group had 10.7 per cent and the Meidling Hospital children had 13.4 per cent exclusive of those caused by premature loss. The malocclusion in practically all cases was very slight and in some of these cases the natural spacing of the incisors was taking place. This again is exclusive of malocclusion the result of premature loss.

In the school children aged six years to fourteen years 266 cases were

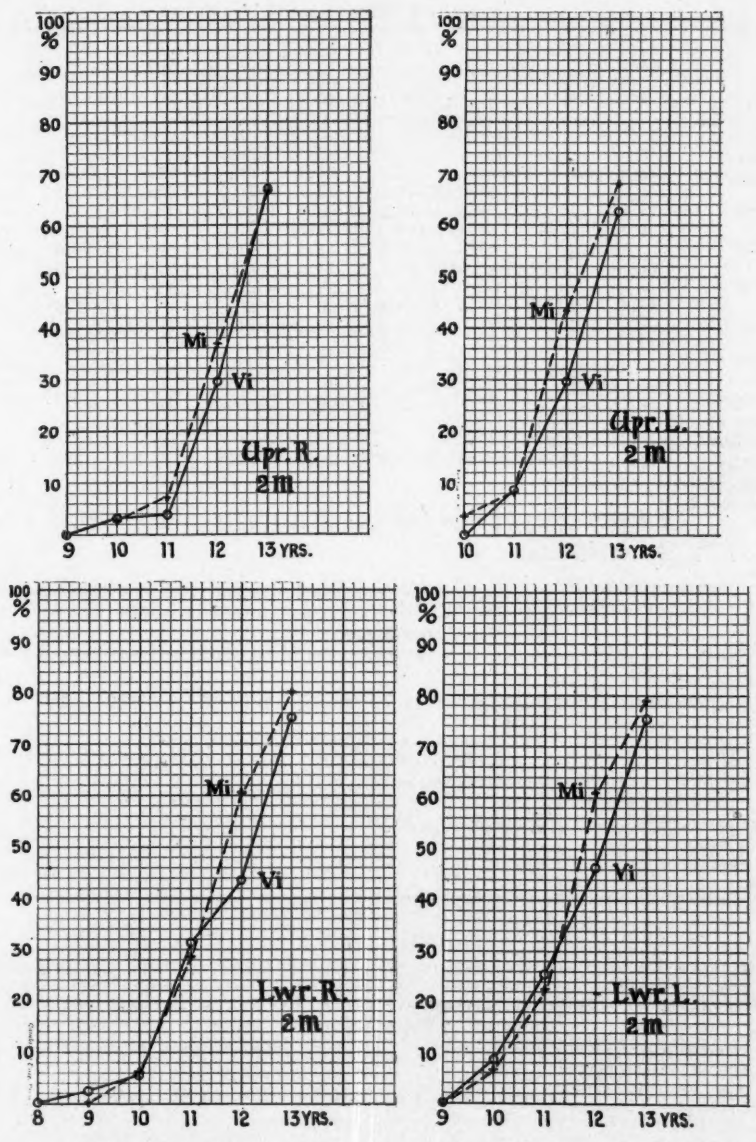

Fig. 12.—Percentage of eruption at each year. Second molars.

examined. Fifty-one and eight-tenths of malocclusion was seen; 19.9 per cent of this malocclusion was due to premature loss of teeth and 31.9 per cent was due to other causes.

All the cases, except one, which were due to premature loss were classified under Class I. The one case came under Class III.

The malocclusion due to other causes was classified as follows:

Class I.	72 cases
Class II.	7 cases
Class III.	6 cases

Of the 72 cases, 9 cases were due to purely local causes, such as ab-

TABLE VIII

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (HOSPITAL CHILDREN VIENNA)

PERCENTAGE OF CARIES OF TOTAL ACTUALLY PRESENT AND PREMATURE

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...
Caries	...	...	...	14.2	21.4	21.4	21.4	...	...	...
Caries	...	6.2	14.2	14.2	28.5	30.7	15.3	12.5	6.2	...
Prematurely lost	...	...	6.6	12.5	12.5	18.7	18.7	...	...	...
Caries	8	11.5	4.5	17.3	26.08	30.4	20.8	4.5	11.5	15.3
Prematurely lost	...	...	15.3	11.5	11.5	11.5	7.6	15.3	...	...
Caries	12.5	9.09	9.09	27.2	33.4	40	27.2	9.5	8.6	16.6
Prematurely lost	4	12	12	12	16	20	12	16	8	4
Caries	38.4	50	7.6	44.4	50	60	44.4	7.6	40	38.4
Prematurely lost	...	23.07	...	30.7	69.2	61.5	30.7	...	23.07	...
Caries	25	50	25	12.5	...	...	28.5	12.5	57.1	37.5
Prematurely lost	...	...	...	...	28.5	28.5	...	...	12.5	...
Caries	25	25	...	...	...	...	...	...	33.4	...
Prematurely lost	...	...	50	50	100	100	50	75	25	...
Total percentage of Caries in each tooth for all ages	13.6	14.5	8.6	17.2	20.7	23.8	20.1	7.5	13.6	16.6
Total percentage of loss in each tooth for all ages	1.04	5.1	9.7	10.5	17.7	18.6	10.6	10.5	5.9	1.03

PERCENTAGE OF CARIES FOUND IN THE PERMANENT TEETH

UPPER JAW

	VI	V	IV	III	II	I	I	II	III	IV	V	VI
	50	...	...	...	...	...	...	...	...	...	...	50
	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	...	...	...	...	...	...	...	...
Total percentage of Caries found in each tooth for all ages.	7.5	...	...	...	...	...	...	...	...	...	...	8.3

TABLE IX

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (HOSPITAL CHILDREN VIENNA)

PERCENTAGE OF CARIES OF TEMPORARY TEETH PRESENT + PREMATURELY LOST

UPPER JAW

	e	d	c	b	a	a	b	c	d	e
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...
...	...	...	14.2	21.4	21.4	21.4	...	...	...	...
...	6.2	13.3	12.5	25	25	12.5	12.5	6.2	...	
8	11.5	3.8	15.3	23.1	26.9	19.2	3.8	11.5	15.3	
12	8	8	24	28	32	24	8	8	16	
38.4	38.4	7.6	30.7	15.3	23.07	30.7	7.6	30.7	38.4	
25	50	25	12.5	...	...	28.5	12.5	50	37.5	
25	25	...	...	...	...	...	...	25	...	
Total percentage of Caries found in each tooth for all ages	13.5	13.8	7.7	15.4	17.05	19.3	18.03	6.7	12.8	16.4

normal attachment of frenum; 8 cases of slight protrusion of maxillary incisors, 14 cases of lingual occlusion of maxillary incisors, 5 cases of open bite, 28 cases of crowding or want of development, and the remaining cases of other very slight malocclusions.

TABLE VIII—CONT'D

LOSS OF TOTAL PRESENT + LOST ON TEMPORARY TEETH

LOWER JAW

e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE OF CARIES AND LOSS IN ALL TEETH FOR EACH YEAR	AGE	NO. EXAMINED
..	..	..	..	..	..	..	..	..	..		12-16 mths.	8
..	..	..	..	..	..	..	..	..	..		16-20 mths.	11
..	..	..	..	..	..	..	..	..	..		20-24 mths.	8
..	..	..	..	..	..	..	..	..	..	4.8	2 years	16
20	43.7	..	6.2	12.5	12.5	6.2	..	37.5	25	14.4	3 years	14
..	..	..	..	..	..	..	6.2	..	..	3.7		
42.3	24	4.5	..	..	..	..	13.04	42.3	30.7	15.8	4 years	26
..	3.8	15.3	7.6	15.3	15.3	3.8	11.5	..	..	7.3		
47.6	40.9	8.3	..	..	..	..	8.6	45.4	47.6	19.4	5 years	25
16	12	4	8	16.6	21.7	8	8	12	16	11.8		
83.3	50	9.09	..	..	..	..	12.5	75	66.6	33.1	6 years	13
7.6	53.8	15.3	23.07	41.6	33.4	30.7	38.4	38.4	7.6	26.3		
62.5	66.6	..	..	..	..	..	12.5	71.4	100	28.5	7 years	8
..	25	..	14.2	33.4	..	28.5	..	12.5	14.2	8.49		
50	50	..	..	..	..	..	..	50	..	17.6	8 years	4
50	50	50	50	100	100	50	50	50	50	46.8		
43.9	30.3	4.3	.92	1.8	1.9	.93	7.8	38.6	39.5	16.1 Total percentage of Caries found in all teeth for all ages.		
7.1	13.1	8.9	7.6	12.4	11.8	8.5	12.7	8.9	8.08	9.8 Total percentage of premature loss in all teeth for all ages.		

LOWER JAW

VI	V	IV	III	II	I	I	II	III	IV	V	VI	TOTAL PERCENTAGE OF CARIES FOUND IN ALL TEETH FOR EACH YR. AGE	AGE	NO. EXAMINED
50	..	..	..	..	..	..	..	..	..	..	50	36.3	5 years	25
25	..	..	..	..	..	..	..	..	..	..	...	6.6	6 years	13
...	..	..	..	..	..	..	..	..	..	..	14.2	2.3	7 years	8
...	..	..	..	..	..	..	..	..	..	..	33.4	4	8 years	4
14.2	..	..	..	..	..	..	..	..	..	..	18.7	7.5 Total percentage of Caries found in all teeth for all ages.		

TABLE IX—CONT'D

LOWER JAW

e	d	c	b	a	a	b	c	d	e	TOTAL PERCENTAGE CARIES FOUND IN ALL TEETH EACH YR. AGE	AGE	NO. EXAMINED
..	..	..	..	..	..	..	..	..	..	..	12-16 mths.	8
..	..	..	..	..	..	..	..	..	..	..	16-20 mths.	12
..	..	..	..	..	..	..	..	..	..	..	20-24 mths.	8
..	..	..	..	..	..	..	..	..	..	4.8	2 years	14
20	43.7	..	6.2	12.5	12.5	6.2	..	37.5	25	13.9	3 years	16
42.3	23.1	3.8	..	..	..	..	11.5	42.3	30.7	14.6	4 years	26
40	36	8	..	..	..	..	8	40	40	17.1	5 years	25
76.9	23.07	7.6	..	..	..	..	7.6	46.1	61.5	24.4	6 years	13
62.5	50	..	..	..	..	..	12.5	62.5	85.7	26.1	7 years	8
25	25	..	..	..	..	..	..	25	..	9.3	8 years	4
40.8	26.3	3.9	.8	1.6	1.7	.8	6.8	35.7	36.3	14.5 Total percentage of Caries found in all teeth for all ages.		

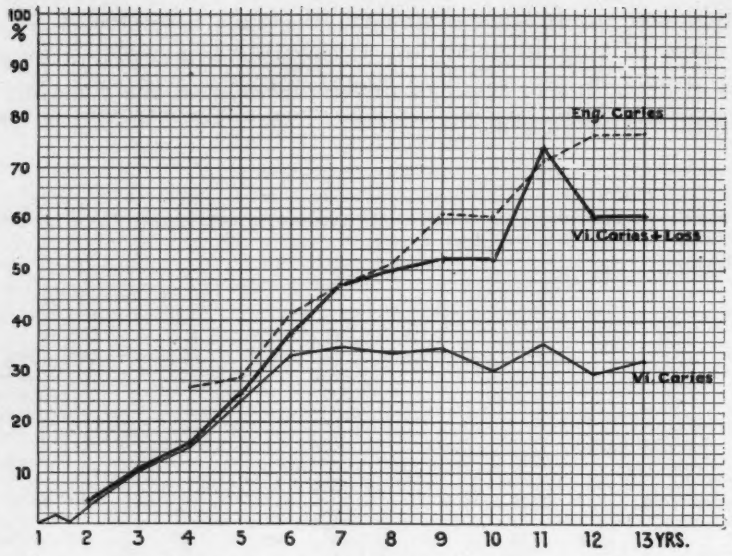

Fig. 13.—Caries; premature loss of deciduous teeth.

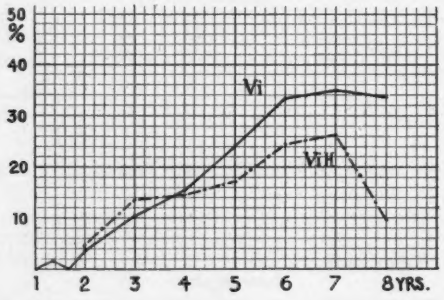

Fig. 14.—Caries in deciduous teeth lost + present.

TABLE X

MEIDLING CHILD WELFARE CENTRE (VIENNA)

	PERCENTAGE OF CARIES OF TEMPORARY TEETH PRESENT + PREMATURELY LOST									
	...	...	...	...	...	...	...	...	...	...
	...	...	...	...	6.6	6.6	6.6	...	...	...
	...	...	...	...	...	...	...	...	...	...
	...	9	...	8.3	...	...	8.3	...	...	...
	...	5.5	5.5	...	11.1	11.1	...	5.5	5.5	...
	17.3	13	4.3	8.7	13	26.1	8.7	4.3	17.3	17.3
	22.8	28.5	8.5	25.7	42.8	40	22.8	2.8	34.2	20
Total percentage of Caries found in each tooth for all ages	14.4	15	5.4	10.9	18.7	19.4	11	3.3	16.6	13.2

TABLE XI

SCHOOL CHILDREN (VIENNA)

	PERCENTAGE OF CARIES OF TEMPORARY TEETH PRESENT + PREMATURELY LOST									
	42.4	28.9	18.4	21.6	36.3	31.2	26.3	13.2	44.7	42.1
	58.3	45.8	16.6	35	33.4	20	36.8	16.6	47.6	52.1
	47.6	50	17.4	...	...	...	...	8.6	45	72.7
	60	30	10.8	...	...	...	...	24.3	48.1	70.5
	43.4	18.7	7.4	...	...	...	33.4	10.3	40	40
	61.5	57.1	17.3	...	...	...	...	24	66.6	91.6
	50	75	27.7	...	...	...	...	15	50	50
	66.6	66.6	37.5	...	...	...	...	33.4	100	33.4
Total percentage of Caries found in each tooth for all ages	52.6	37.1	16.6	18.2	32.6	24.5	22.7	17.07	48	57

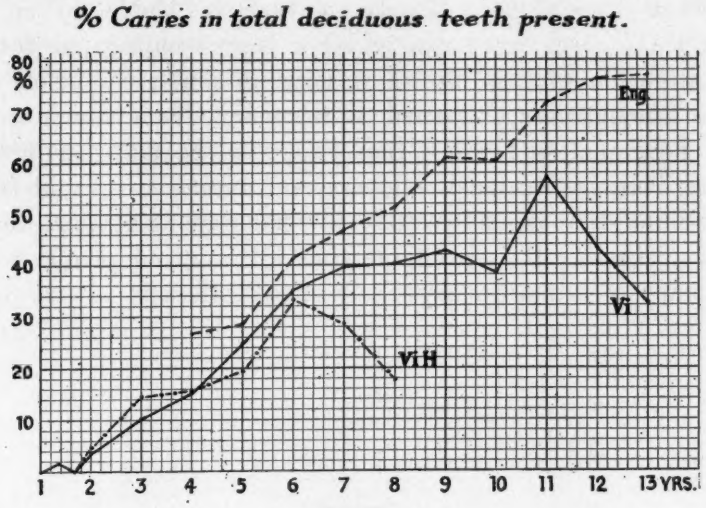

Fig. 15.

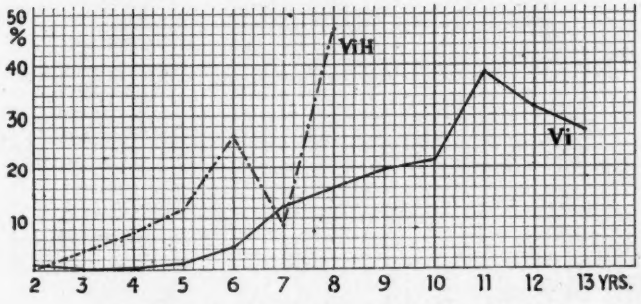

Fig. 16.—Premature loss of deciduous teeth.

TABLE X—CONT'D

..	..	..	..	..	..	..	..	..	..	..	7-16 mths.	11
..	..	..	..	..	..	..	..	..	..	1.6	16-20 mths.	15
..	..	..	..	..	..	..	..	..	..	..	20-24 mths.	2
12.5	..	..	..	8.3	8.3	8.3	..	..	14.2	3.8	2 years	12
44.4	38.8	..	..	..	..	..	..	27.7	50	10.2	3 years	18
34.7	47.8	..	4.3	4.3	4.3	4.3	..	34.7	43.4	15.2	4 years	23
62.8	54.2	2.8	..	..	..	..	2.8	45.7	65.7	24.3	5 years	35
46.4	36.6	1.09	.9	1.7	1.7	1.8	1.09	29	51.8	14.4	Total percentage of Caries found in all teeth for all ages.	

TABLE XI—CONT'D

63.1	52.6	13.2	12.5	4.1	8.2	12.5	7.9	73.6	78.9	33.2	6 years	38
58.3	58.3	8.6	5.8	..	25	5.8	4.1	58.3	54.1	34.9	7 years	24
60.8	60.8	8.6	..	..	..	..	4.8	45.4	43.4	33.8	8 years	23
47.05	45.4	3.03	..	..	..	..	6.06	57.6	38.2	34.5	9 years	39
48.2	40.9	17.6	..	..	..	..	52.6	45.8	44.9	30.2	10 years	36
28.5	30.7	30.7	..	..	..	..	25	47	13.04	35.5	11 years	35
23.2	42.8	..	..	..	..	..	25	22.2	31.5	29.4	12 years	41
40	33.4	..	..	..	..	..	..	..	28.5	32.1	13 years	24
49.2	49.07	10.8	9.2	3.4	10.7	9.2	8.1	52.6	46.1	33.3	Total percentage of Caries found in all teeth for all ages.	

Of the seven cases of Class II only one case was bad.

The Class III cases were nearly all a very complicated form.

An investigation of this nature is open to much criticism. Many will consider that the number examined is too small from which to draw conclusions but nevertheless I think that you will see many points which are of importance in the problems of etiology and dental caries and malocclusion.

It is possible that vitamines play a very important part in the causation of these diseases. It is probable that all civilized people are suffering from a deficiency of vitamines especially the dwellers in towns.

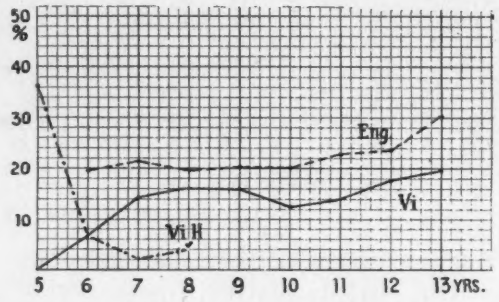

Fig. 17.—Caries in permanent teeth.

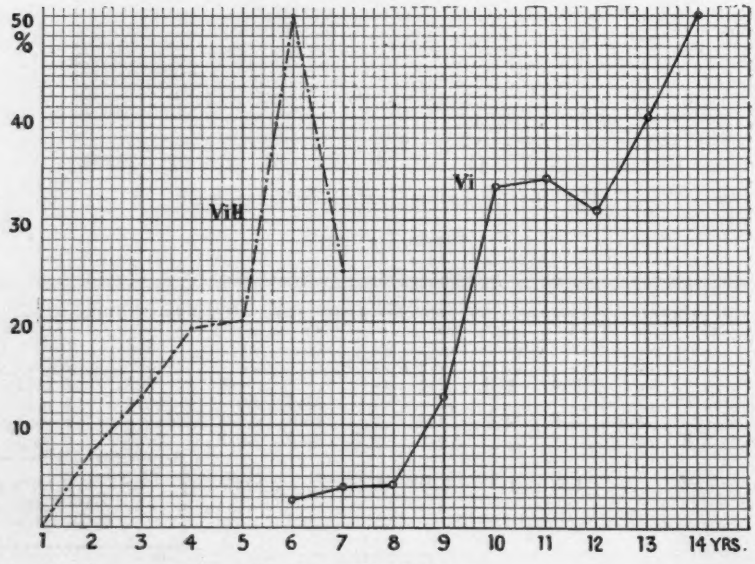

Fig. 18.—Unhealthy gums.

In the country one finds better teeth and better developed arches. I once examined the children attending a school on the west coast of Ireland. They were the sons of small farmers and fishermen. It is a very wild and desolate region and the diet of these people was very primitive.

For breakfast, bread and butter, tea or milk. For dinner, potatoes, salted fish and milk; and on Sundays, potatoes, salted meat, cabbage and milk. For supper, bread and butter, tea or milk. In the winter milk is scarce. The amount of caries was comparatively small. There was practically no malocclusion.

The conclusions which I draw from the examination of the Vienna children whose diet was very deficient were as follows:

The weight and height were greatly below normal. Rickets, tuberculosis, and anaemia were very prevalent. Mouth breathers were not so frequently met with as in England.

Gingivitis was very common especially in the rickety children.

Hypoplasia and white patches were met with in a high percentage of the children.

Caries was not so prevalent as in England.

The eruption of the deciduous teeth was delayed especially in the rickety

TABLE XII

MEIDLING CHILD WELFARE CENTRE (VIENNA)

PERCENTAGE OF CHILDREN WITH UNHEALTHY GUMS
.806 of the total number examined had unhealthy gums. 124 children were examined.

TABLE XIII

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (VIENNA HOSPITAL)

AGE	UNHEALTHY GUMS	NO. EXAMINED
1 year	....	28
2 years	7.14	14
3 years	12.5	16
4 years	19.23	26
5 years	20	25
6 years	53.33	13
7 years	25	8

TABLE XIV

SCHOOL CHILDREN (VIENNA)

AGE	UNHEALTHY GUMS	NO. EXAMINED
6 years	2.63	38
7 years	4	25
8 years	4.16	24
9 years	12.82	39
10 years	33.33	36
11 years	34.28	35
12 years	30.95	42
13 years	40	25
14 years	50.	4

children. The eruption of the permanent teeth was also delayed in the rickety children.

The deciduous teeth were lost prematurely in a large percentage of cases, which is contrary to the results that Mrs. Mellanby obtained in her experiments.

Malocclusion did not seem as marked as in England except that produced by premature loss.

Before concluding I would like to say how grateful I am to Professor von Pirquet, and the Friends' Relief Mission for giving me the facilities to carry out this investigation. All the other Austrian doctors with whom I came in contact gave me the greatest assistance.

PERCENTAGE OF CHILDREN WITH DEVELOPMENTAL DEFECTS

TABLE XV

MEIDLING CHILD WELFARE CENTRE (VIENNA)			
AGE	HYPOPLASIA	WHITE PATCHES	NO. EX.
1 year	.....	12.48	24
2 years	.....	.....	14
3 years	16.66	5.55	18
4 years	.....	.....	22
5 years	2.85	5.7	35
6 years	.....	.....	4

TABLE XVI

MEIDLINGER KRIEGSSPITAL AMERIK-KINDERHEILSTATTE (HOSPITAL CHILDREN)				
AGE	HYPOPLASIA		WHITE PATCHES	NO. EX.
	Temporary Teeth	Permanent Teeth		
1 year	....	....	10.71	28
2 years	....	....	7.14	14
3 years	6.25	....	18.75	16
4 years	3.7	....	3.7	27
5 years	8	4	4	25
6 years	7.69	15.38	7.69	13
7 years	....	12.5	....	8

TABLE XVII

SCHOOL CHILDREN (VIENNA)				
AGE	HYPOPLASIA		WHITE PATCHES	NO. EX.
	Temporary Teeth	Permanent Teeth	Permanent Teeth	
6 years	23.68	13.15	13.15	38
7 years	12	16	....	25
8 years	20.83	29.16	20.83	24
9 years	7.5	35	22.5	40
10 years	5.55	33.33	16.66	36
11 years	....	20	14.28	35
12 years	4.76	23.81	12.04	42
13 years	2.7	22.22	8.33	25

APPENDIX I

The calorie requirement of average civilians. Extracts from "The Feeding of Nations" by Prof. E. H. Starling.

The calorie requirement of an average civilian doing average work is 3000 calories.

The proportion of a child to a man is 0'5 to 0'6.

The calorie requirement of a child is 1500 to 1800 calories, this can be obtained for a man from:

Protein	100 grams	= 3390 calories.
Fat	100 grams	
Carbohydrate	500 grams	

The importance of fat. It is stated that a quarter of the total calories of the average diet should be in the form of fat. On this ratio a man should have 75 grams of fat daily (2.6 oz.). A child at the breast takes 50 per cent calories in the form of fat.

The calorie value of the German diet was about 1500 calories per man, and the Austrian diet was very much lower.

APPENDIX II

English rations during part of the war period.

Sugar ½ lb. per week.
Fats 1½ oz. butter per week. Margarine could usually be purchased in addition.
Meat (Butchers) about 1 lb. or somewhat less per week.
(Other meat) about 5 oz. per week.
Jam 12 oz. per six weeks.

Nursing mothers received the food in addition which the child would otherwise have had.

For nursing and expectant mothers milk could be prescribed by a physician.

For expectant mothers extra meat 2 coupons (about 6 oz.) or 1½ oz. butter.

Children under 18 months received 1½ pints milk daily, sold at a reduced price or free.

Over 18 months to 5 years 1 pint daily.

Fresh milk if available, otherwise preserved.

Adequate amount of sugar to be provided at centres for children who were bottle fed.

Bread, potatoes, and vegetables not rationed.

TABLE XVIII

MEIDLING CHILD WELFARE CENTRE (VIENNA) MALOCCLUSION

AGE	CLASS	
11 mths.	Class I	Frenum separation of a | a
1 yr. 7 mths.	Class I	Protrusion of a | a thumb-sucking
1 yr. 7½ mths.	Class I	Protrusion a | a finger-sucking
2 yrs. 3 mths.	Class I	Frenum separation of a | a
2 yrs. 6 mths.	Class I	Slight rotation of a | a mesial angles lingual
3 years	Class I	Slight crowding rotation of a | a mesial angles lingual
3 years	Class I	Slight protrusion. Probably a mouth-breather
4 years	Class I	Crowded lower incisors. Narrow upper arch
4 years	Class I	Protrusion. Thumb-sucking
5 years	Class I	Crowded lower incisors b | lingual to c | a | a rotation mesial angles lingual
5 years	Class I	Crowded lower incisors rotation a | a mesial angles lingual
5 years	Class I	Supernumerary lateral in lingual occlusion
5 years	Class I	b a | a b may be a little lingual to c | c 121 Children were examined. 10.7% with malocclusion

TABLE XIX

MEIDLINGER KRIEGSSPITAL AMERIK KINDERHEILSTATTE (HOSPITAL CHILDREN VIENNA) MALOCCLUSION

AGE	CLASS	
2 yrs. 10 mths.	Class I	Slight crowding of upper incisors
3 years	Class I	Slight crowding of lower incisors a | a quite loose. No recession or hyperaemia a | a rotated mesial angles lingual
3 yrs. 6 mths.	Class I	Big overlap of incisors
3 yrs. 7 mths.	Class I	i | i rotated mesial angles lingual
3 yrs. 8½ mths.	Class I	Crowding of upper incisors a | a a little in labial occlusion
4 yrs. 6 mths.	Class I	b | b in slight lingual occlusion to c | c arch a little narrow between c | c $\frac{c\ b\ a \mid a\ b\ c}{a\ a \mid a}$ lost.
4 yrs. 6 mths.	Class I	Slight crowding of c b | but spacing taking place
4 yrs. 6 mths.	Class I	Slight open bite in incisal region from biting fingers. It may also account for separation of a | a
4 yrs. 6 mths.	Class I	Slight crowding of lower incisors $\frac{c \mid c}{c \mid}$ lost $\frac{a \mid a}{a \mid a}$ quite loose
4 yrs. 9 mths.	Class II Div. I	Slight Malocclusion the result of premature loss of deciduous teeth
3 yrs. 10 mths.	Class I	Drifting, and contraction of upper arch between c | c and space for $\frac{\mid c\ \ c \mid a\ b}{\mid c}$ lost
4½ years	Class I	Drifting into space for $\frac{\mid c}{}$ $\frac{c \mid c}{c \mid}$ lost
4¾ years	Class I	Tilting of teeth lingually & mesially towards space for $\frac{a \mid a}{b\ a \mid a\ b}$ $\frac{a \mid a}{b\ a \mid a\ b}$ lost
5 years	Class III	Complicated by mesial drifting of e | e. c | b c completely labial to upper incisors c | b c very elongated cervical caries d b a | a d lost

TABLE XIX—CONT'D.

AGE	CLASS	
5¼ years	Class III	Slight contraction between $\overline{b \mid b}$ due to loss of $\overline{a \mid a}$. Broader portion of lower arch is occluding with narrower portion of upper arch. Left side lingual occlusion of $\frac{\mid d\ e \quad c\ b\ a \mid a\ b\ c}{a \mid a\ e}$ lost
5¾ years	Class I	Greater mesial drifting of $\underline{b \mid b}$ than $\overline{b \mid b}$. Disto buccal cusps of $\underline{b \mid b}$ in buccal grooves of $\overline{b \mid b}$. Elongation of $\overline{c\ b \mid c}$ Cervical caries $\frac{e\ d\ c\ b\ a \mid a\ b\ c\ d\ e}{e\ d \quad a \mid a\ b \quad d\ e}$ lost
6 years	Class I	Mesial drifting of $\frac{\overline{e \mid e} \quad c\ a \mid a}{d\ b \mid b\ c\ d}$ lost.
6 years	Class I or III	Will probably develop into Class III. Mesial drifting of $\underline{e \mid e}$ and distal drifting $\underline{c \mid c}$. $\frac{d\ b\ a \mid a\ b\ d}{d \quad a \mid a \quad d}$ lost
5¼ yrs.	Class I	Slight crowding of lower incisors $\underline{\mid a}$ in lingual occlusion biting inside lower incisors $\overline{c\ b\ a \mid a\ b\ c}$ very loose and gums hyperaemic
5¼ yrs.	Class I	$\overline{b \mid}$ in lingual occlusion $\overline{a \mid}$ in labial occlusion. Arch contracted between $\underline{c \mid c}$
5¼ yrs.	Class I	Crowding of lower incisors $\overline{\mid a}$ in labial occlusion contraction between $\frac{c \mid c}{c \mid c}$ $\frac{a \mid a}{\quad}$ in labial occlusion
5½ yrs.	Class I	Lingual occlusion of $\underline{a \mid a}$
5¾ yrs.	Class I	Open bite in incisal region $\frac{a \mid a\ c}{c \mid c}$ lost $\frac{c \mid b}{a \mid a}$ elongated and loose.
5¾ yrs.	Class III?	Possibly wrong bite cervical caries $\frac{c \mid c}{\mid b}$ lost
7 years	Class III	Slight crowding of lower and upper incisors and mesial relation of lower molars & jaw. Lingual occlusion of $\underline{c\ b \mid}$ edge to edge of $\underline{\mid b\ c}$
7 yrs. 5 mths	Class I	Open bite between $\frac{b \mid b}{b \mid b}$ $\frac{a \mid a}{a \mid}$ missing, $\overline{\mid i}$ erupting
134 children were examined		13.4% with malocclusion, exclusive of cases due to premature loss
6¼ years	Apparent	Class III relation $\frac{d\ c\ b \mid b\ c}{e\ c \mid e}$ so loose that they could be lifted out. A good deal of roots not absorbed except $\overline{e \mid e}$ no sign of permanent teeth $\frac{a \mid a}{d\ b\ a \mid a\ b\ c\ d}$ lost
6¼ years	Class III	Lower molars in mesial relation $\frac{b\ a \mid a\ b}{e\ d\ c\ b \mid b\ c\ d\ e}$ lost
6½ years	Class I	Slight crowding of lower incisors. Mesial drifting of $\overline{e \mid}$ & distal drifting of $\frac{}{c \mid}$ $\frac{a \mid a\ b}{d \mid d}$ lost
6½ years	Class I	Mesial drifting of $\underline{b \mid b}$ into spaces for $\underline{e \text{ or } d \mid e \text{ or } d}$. Cervical caries $\underline{d \mid d}$ lost
6½ years	Class I	Mesial drifting of $\frac{e \mid e}{e \mid e\ d}$ $\underline{\mid e}$ in lingual occlusion $\frac{d\ b\ a \mid a\ b\ d}{d\ c\ b\ a \mid a\ b\ c}$ lost
6¾ years	Class I	Contraction between $\underline{c \mid c}$ $\underline{\mid b\ c}$ in lingual occlusion $\frac{\mid a}{a \mid a}$ lost
8 years	Class I	Mesial drifting and tilting of $\overline{b \mid b}$ and drifting of $\underline{\mid e}$ mesially $\frac{c\ a \mid a\ c\ d}{e\ d\ c \mid c\ d\ e}$ lost

APPENDIX III

Diet used in feeding puppies in experiments carried out by Mrs. Mellanby and called Diet "A."

Diet A
Separated milk 175-250 c.c. per day.
White bread, ad. lib.
Yeast (water soluble "B" Vitamine) 5-10 gr. per day.
Orange juice (antiscorbutic vitamine) 255 c.c. per day.
Sodium chloride, 1 gr. per day.
In most cases lean meat, 5-5 gr. per day.

Of 35 puppies fed on very deficient fat-soluble "A" diet (Diet A), 29 showed very irregular teeth.

Of 5 puppies fed on Diet A × 10 c.c. linseed oil and extra separated milk, 4 had slightly irregular teeth and 1 regular.

Of 19 puppies fed on Diet A × 5 to 7.5 c.c. of codliver oil per diem, 4 had slightly irregular teeth and 15 were regular.

i.e., 89 per cent irregular on deficient diet.
20 per cent slightly irregular on efficient diet.

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DISCUSSION

Dr. A. Leroy Johnson, Boston, Mass.—The American Society is very fortunate to hear the report of an investigation of the nature and significance of that which Mr. Friel has just presented. It has been my privilege to study the charts with Mr. Friel, and, although he will tell you that literally the result of his investigation is negative, I thoroughly believe the data which he secured and exhibits here constitutes a foundation for a study of developmental conditions of dental structures we are sadly in need of. Mr. Friel made the trip to Vienna at his own expense, inspired by the desire to know something of the etiology of maxillary deformities.

I wish, when he is closing the discussion, that Mr. Friel would tell the society about the social and economic conditions under which the profession is living and laboring today.

Dr. Milo Hellman, New York City (discussing Dr. Friel's paper).—I wish to thank Dr. Friel for giving us the results of his interesting investigation, and congratulate him on the success of his efforts in such a worthy cause. There are few orthodontists or dentists who would sacrifice the time, the energy and the money that are involved in conducting an investigation of this sort. I highly appreciate what he has done, and I wish to express my thanks to him for it.

I want to emphasize his remarks by adding similar facts bearing on the shedding of teeth as a factor in the etiology of malocclusion. There is found to be prevalent in cases

where nutrition or care in general is involved an accelerated rate in this process. Last year I read a paper before this society and reported an investigation of 1250 children among the poor of New York. Manifestations were brought out (which will be elaborated later on), namely, that owing to economic conditions their stature and weight were low, and that owing to a lack of dental care and to improper food their teeth decayed extensively and the shedding process of the deciduous teeth was hastened. And coincident with these manifestations there is malocclusion of the permanent teeth. But this does not appear in such high percentage of cases as one would expect if malocclusion of the teeth were due to those conditions alone.

On the other hand, investigations of children of the wealthy show a considerably high average in stature and weight, and a slowing up in the process of shedding of the deciduous teeth. *But* there is an increase in the percentage of cases of malocclusion.

The wealthy it must be stated depend to a very large degree upon the modern pediatrist for the rearing of their children. The modern pediatrist is able, by his skill and knowledge in artificial feeding to increase the size and weight of children under his care. But as shown by McCollum in his experiment, tallness has nothing to do with healthfulness. Tall animals are not always healthy animals and healthy animals are not always tall animals. Thus we see, for example, that the tall children shed their teeth at a later period than the small ones. But they also show a higher percentage of malocclusion.

By Melanby's experiments, we learn that by means of certain food deficiencies the animal retained the deciduous teeth for such long periods as to bring about the eruption of the permanent series in malocclusion. We may therefore be safe in saying that not the lack of food, but rather the presence of it in improper quality is conducive to malocclusion of the teeth.

Mr. Sheldon Friel, Dublin, Ireland (closing).—I thank you very much for your invitation to be present at this meeting and for the way you have received my paper.

The state of the professional classes in Vienna at present is very dreadful. During the War the middle classes fared much better than the working classes; the latter could not afford to buy more food than the rations and sometimes not even these. Since the Revolution the working man is on top and his wages have gone up a great deal in proportion to the enormous rise in the cost of living, whereas, the income of the professional man has increased very little.

The university professors and men of that type are literally starving. The best paid professors get an equivalent of less than $100.00 a year and the majority get a quarter of that amount, or considerably less.

I learned a little about the dentists and found that a great number of them are in great need. The majority of their patients belong to the middle class and as these are the people that are suffering most at present, it is obvious that the fees they receive from them are relatively small.

When I returned to Ireland, I suggested at a Dental Meeting in Dublin, that a small fund should be raised from among Irish dentists to be sent to Vienna dentists for Christmas. The following is one of the letters that I received from a Vienna dentist, who received help from this fund.

The fund was sent to the Friends' Relief Mission in Vienna for distribution.

"Before I express my thanks to you for the help given to me through the Friends' Relief Mission, may I, as briefly as possible relate my experiences and explain my position to you, for I wish not only to thank you but also to make it clear why I feel justified in accepting your generous assistance.

"After finishing my medical studies, I took a course of dentistry at our university in Vienna and took my dentist's degree at the Northwestern University Dental School in Chicago, where Black was then lecturing.

"After years of hard work I established at last an excellent practice among the well-to-do people in Vienna. Then the war broke out and I volunteered at once as army doctor, but at the end of a week I was taken prisoner by the Russians and sent to Siberia where I spent six years. I was in various camps in eastern and western Siberia, chiefly in

small cities; I practiced Medicine during various epidemics. Then I was fortunate enough to have quite a good dentist's equipment placed at my disposal by the Red Cross Society, so that I was enabled to practice my profession among the prisoners during the last years of my captivity. For the first two or three years, except for the fact that we were prisoners, we did not fare badly. However, upon the outbreak of internal unrest in Russia and with the increasing needs of the population our standard of living gradually sank lower and lower until we practically lived as beggars. Then, when the Bolshevists came, the camp was disbanded and we all had to earn a living as best we could.

My dental equipment was illegally requisitioned by the military authorities. Two women dentists had formerly practiced in the city. (It is interesting to note that in the years I spent in Siberia I came into contact with women colleagues only.) One of the two succeeded in escaping, the other remained behind. The consulting rooms, where the latter had practiced most successfully, were seized by the State and turned into a public clinic, where everybody had a right to free treatment. We were both placed there as dentists by the Board of Health so that she, at least, had the advantage of being able to remain in her own house and work in her own rooms. For a few months we were put into the food class of the lowest rank, the monthly ration for which was 4 lbs. of meat, 22 lbs of black flour and some salt. We also received a monthly salary of 1,800 Roubles—this did not even pay for the mending of a pair of boots. Later on we were classed with the Red Guards but our salary was still too small to live on. However, it was so with the whole population, and the educated people were systematically ruined. We just managed to live by exchanging the last of our possessions for food with the peasants. But that was gradually stopped, as no one was allowed to leave the town and place to which he was assigned. Finally, the hour of freedom struck for me. At the beginning of October I was declared seriously "invalided" and assigned to a proletariat transport. (The slightly invalided and healthy were the last to be allowed to return to their homes.) After a journey of eight weeks full of excitement and difficulties (by way of Moscow and Riga), I finally reached home (December, 1920), literally in rags. However, I had the great joy of finding my wife and two children alive and well—I had no news of them for a year and a half. During my absence my wife had rented my rooms, and so had at least been able to keep our flat—a great piece of good luck, as there are no flats to be had now either in Vienna or in the provinces. The help my family received from the State was very small, so that in the course of years the little property that I owned was exhausted; jewels and other things not absolutely indispensable were sold. I had become tuberculous on the journey home and after my return I was unable to work for the first few weeks. The general conditions in Vienna are as sad as they can well be and perhaps, dear Sirs, it may be of interest to you if I give you some idea of the difficulties against which your Austrian colleagues have to contend.

"During the war and after, the distribution of food was undertaken by the State but the rations of each individual were so small, that it was impossible to live on them alone. I am not exaggerating when I say (I heard this from many medical men) that large numbers of people literally died from hunger. The more difficult the question of food became, the higher the prices owing to the large amount of profiteering carried on. To avoid starvation everybody used every means he had at his disposal. Because of profiteering, prices rose enormously and remained very high and even continued so when later the food products were only partially or had entirely ceased to be rationed by the State. The same is true of dress materials, boots, and shoes, underwear; so the "Mittelstand" which had suffered most in the general social changes was obliged to sacrifice its all in order to keep alive.

"Now the private dentists are dependent upon the well-to-do, educated middle-class. These people, who have risen by speculation and profiteering and who make a great display of wealth have not yet reached the stage of refinement when they value a proper care of their teeth. They flock to inferior dentists who understand how to flatter them. The working class, too, which is much better off in every way since the war is not yet educated up to good dentistry, but is content with the services they get from their "Krankenkassa" dentists.

"Another reason for the difficulties of our position is that almost all our dental instruments and other necessities come from foreign countries. Because of the very low

value of our money, we have to pay unheard-of prices for them; a "Black" drill, for example, costs 600 Kronen, a sum on which in pre-war times, a small family could have lived comfortably for a month. Many of our materials cost 40 to 50 times as much again, gold 100 times. The wages of the assistants and mechanics are 20 times as high as formerly. Naturally the dentists were obliged to raise their fees, but they could not make them more than 10 times what they were formerly, as no one would have been able to pay them. I have talked to a number of my colleagues whose integrity is above question and they all assure me that with the greatest industry they can only earn enough to furnish themselves and their families with the bare necessaries of life.

"Besides this, the political revolution has brought a most unfavorable conclusion to the fight that we dentists have been waging for many years with the "Zahn-Techniker," i.e., dentists who have not yet taken their dental degree, and who were originally only allowed to do the mechanical part of the work (such as making false teeth, plates, etc.). It was suddenly decided that no distinction should be made between dentists who have taken their degrees and those who have not, with the single exception that the former still have the sole right of extracting teeth, but that will undoubtedly be granted to the mechanics in the near future. Another circumstance, much to be regretted is that because of the low rate of exchange we are no longer able to subscribe to foreign Dental Magazines, and that it has become quite impossible for our young colleagues to study abroad. This, of course, interrupts the exchange of ideas so necessary in our profession.

"A young dentist just about to start a practice for himself needs more than 200,000 Kronen for the barest necessities (chair, motor, instruments, materials, etc.); for this sum in pre war times he could have bought a large estate.

"Now, to return to my own case, I need not tell you how injurious to a dentist's practice an absence of six and a half years must inevitably be. I hope, however, that in the course of time I shall succeed in building up my practice again, so that I can, at least, support my family, but I have to begin at the beginning again, and this time quite without resources. You can, therefore, realize what a tremendous help you are giving me and how indescribably great my relief is from the most pressing anxiety about the immediate future. Through your generosity I am able to purchase a supply of the most necessary materials and to pay my most urgent expeness, but I am grateful for far more than the material help. It came at a psychological moment when I was deeply depressed. When brutal egotism is flourishing, when one feels that everything fine and noble in the world is going to pieces, one doubly appreciates and values sympathy and friendly assistance. At such a time one's courage and optimism are revived.

"Please accept my most heartfelt thanks and be assured that I shall make every effort when times are better to transfer to others in need the debt I owe to you."

AN EFFICIENT LINGUAL LOCK*

By Ernest N. Bach, A.B., D.D.S., Toledo, Ohio

IN presenting this lingual lock to the members of the specialty, I wish to state, while it may not prove satisfactory to some hands, it has proved satisfactory with the author, and other orthodontists who have used it. Although not perfect, I believe it to be of a correct principle.

While considering some sort of attachment for a lingual removable wire, these points were kept in mind; something which would be efficient; simple; easy to make; easy to remove and replace; occupy the least lingual space, and one which would rotate molars and yet maintain the rigidity of the attachment.

Lock No. 1 fulfills these requirements very well, and is used on molars requiring rotation. Lock No. 2 is used on molars not requiring rotation, and is much more stable than the No. 1 lock.

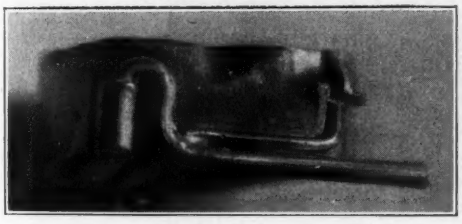

Fig. 1.

Fig. 2.

Fig. 1.—Lock No. 1. Shows the lock used on molars requiring rotation. The locking spring wire lying close to the arch wire and bent occlusally to engage the "catch" on the upper right occlusal edge of the band

Fig. 2.—Lock No. 2. Shows the lock used on molars not requiring rotation, and also used in combination with the No. 1 lock, where one molar may require rotation and the other not. The "catch" is the same as on the first lock but the lug soldered to the arch wire takes the place of the locking spring wire.

The materials used in these locks are described here: Band Material, .20″ × .005″ Ney-Oro Band Material No. 3. Lingual wire, .037″ (19 gauge) Ney-Oro Elastic wire. Locking spring wire, .023″ (23 gauge or larger if desired), Aderer No. 4 wire. Round tubes .060″ × .037″ × 3/32 Blue Island Co. (noble metal). The "catch," .037″ wire Aderer No. 4.

Whatever kind of band is used, the lingual surface must be free from all attachments that would interfere with the lock.

The 19-gauge Ney-Oro elastic wire allows the use of the Lourie wire stretching pliers if desired, although iridioplatinum or other noble metal wire may be used for the stabilizing wire.

The ends of the arch are bent, forming the pins, (Fig. 3) or the pins may be soldered on as in Fig. 10, and the solder trimmer, Blue Island Co. (Fig.

*Clinic given before the American Society of Orthodontists and the Dewey Alumni Society, Atlantic City, April 26-30, 1921.

13,*a*) used to remove the excess solder, by slipping the trimmer over the pin and giving it a rotatory movement, cuts off the excess solder leaving a square shouldered joint to rest against the top of the tube.

CONSTRUCTION

The appliances are made indirectly. Assuming we have the bands on the model, on the molar teeth, the tubes are soldered on the distolingual surface of the band, midway between the occlusal and gingival edges of the band. This position reduces the lingual interference (Fig. 3, *a*).

The "catch" is made by filing a square notch in the end of a 19-gauge wire deep enough to receive the 23-gauge locking spring wire. The "catch" is soldered near the occlusal edge of the band in the region of the mesiolingual cusp, with the notched side next the band (Fig. 3, *b*) and cut off as in Fig. 3, *c*. By bending the stabilizing wire to form the pins (Fig. 3, *c*) the arch can then be adapted to the model as desired. The locking spring wire is soldered to the arch wire at the angle formed by the horizontal and vertical portions of the arch, extending anteriorly, lying close to the arch wire, and bent occlusally

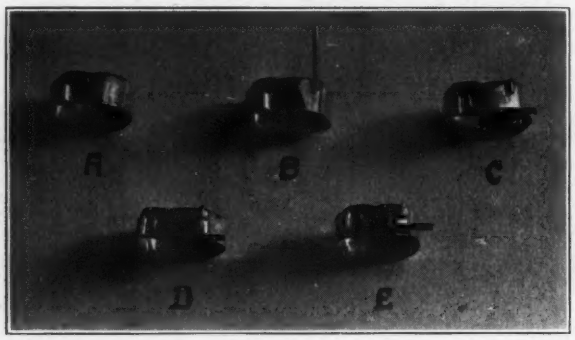

Fig. 3.—Shows the progressive steps in making the first lock.

at the "catch," and then at right angles to engage the same (Fig. 3, *d*). Fig. 3, *e*, shows the finished lock, as shown in the No. 1 lock. A large locking spring wire can be used, and is desirable, in place of the 23-gauge wire. The free end is filed thin enough to engage the "catch." A 21-on 20-gauge wire is a desirable size, as stresses of mastication have a tendency to dislodge the lighter wire.

With the locking spring lying close to the stabilizing wire, forces of mastication very seldom send the locking wire beyond its tension point, as it strikes the stabilizing wire and the stress is taken up by the larger wire, and the locking spring wire usually returns to normal position.

With the exception of the locking spring wire, the No. 2 lock is made in exactly the same manner as the No. 1 lock. In place of the locking wire the end of the Aderer No. 4 wire 20-gauge, is filed flat on both sides just thin enough to engage the "catch," and this is bent at right angles just far enough from the end, to fit between the stabilizing arch and the "catch." This leaves the round end of the wire free to hold while soldering to the stabilizing wire, at the same time having the flat engage the "catch" to give

an accurate adaptation to the lock. The surplus wire is cut off, the soldered joint polished, leaving the lock shown in No. 2.

This attachment can be used buccally or lingually as shown in Fig. 9.

It has proved very satisfactory to use a combination of the two locks, especially on the mandibular molars or the lingual, that is, using the No. 1 lock on the molar band, the No. 2 lock on the other. It is easier on the mandibular molars to remove the No. 2 lock after removing the lock with the spring wire. However, on the maxillary molars their lingual incline does not afford protection to the locking wires, and the No. 2 lock is the most desirable unless the molars require rotation.

Fig. 4, *a*, shows the No. 1 lock in which the pin has been soldered to the arch wire; *b*, differs only in the method of bending the locking spring wire to avoid stresses of mastication; *c*, shows still another form of lock wire attachment. In this attachment, the "catch" is made as described, but soldered midway occlusogingivally on the band, with the occlusal end ground flat for the stabilizing wire to rest upon, it having been bent as shown in the figure. The locking wire, 23-gauge, is soldered to the stabilizing wire and bent gingivally and at right angles to engage the "catch." The stabilizing wire protects the locking wire from mastication stresses in this form of attachment. Fig. 4, *d* is the

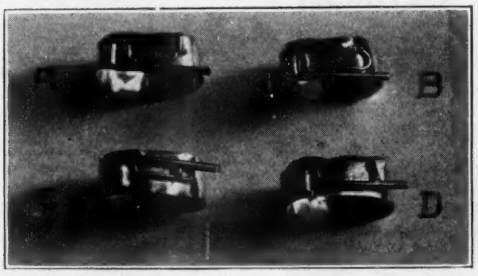

Fig. 4.—Shows various ways in arranging the locking spring wire to avoid stresses during mastication. "D" shows the second form of lock shown before.

same as the No. 2 lock. In case the No. 2 lock has been used, and it is desired to rotate the molar to which it is attached, the lug portion which engages the "catch" can be unsoldered, and a locking spring wire soldered in its place, and adjusted, as the same "catch" is used in all cases thus simplifying and making the parts interchangeable.

These locks require the least possible space in the mouth, as they project lingually only the thickness of the 19-gauge wire, the tubes being inclined toward the embrasure.

When replacing the arch, start the pin portion in the tubes, pressing the pins to place first, then snap the locking wires. Care must be taken to see that there is no buccal or lingual tension in the locking wires, as a rotation of the molars is apt to result which will be described later. The correct placing of the tubes and bending of the stabilizing wire will prevent the lock from impinging on the gums, of course depending upon the case, as a great many times it is not advisable to use a lingual removable arch.

To remove the No. 2 lock, the arch wire is caught with a pair of pliers just anterior to the lug, and pressed gingivally until the lug clears the

"catch," at the same time springing lingually and removing. One side is removed at a time. To replace, one side is replaced at a time, being sure that the pins are in the tubes as far as possible before snapping the lug to place.

In both attachments, the pin and tube fitting accurately, prevents all movements except that of rotation. This is prevented in the No. 1 lock by the locking spring wire, and in the No. 2 lock by the tension of the stabilizing wire.

ROTATION OF MOLARS

The No. 1 lock provides an arrangement for the rotation of molars. It is not always desirable to rotate molars using the same axis of rotation. Thus

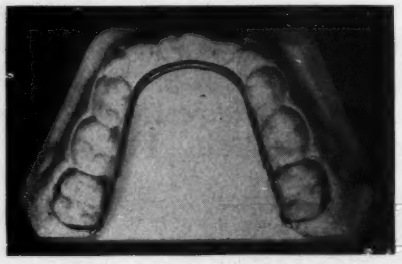

Fig. 5.—Showing a practical case with the removable lingual arch held in place by the No. 1 lock.

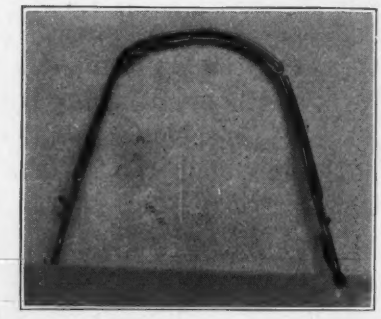

Fig. 6.—Shows the lingual arch used in the case in Fig. 5. The arch wire is shown inverted to show the springs which are located gingivally when in position in the mouth.

Fig. 7.—A practical case showing the position of molars, requiring rotation. The molars are made of amalgam and mechanically arranged to show the effect of spring movement in rotating them. This shows the molars before rotation.

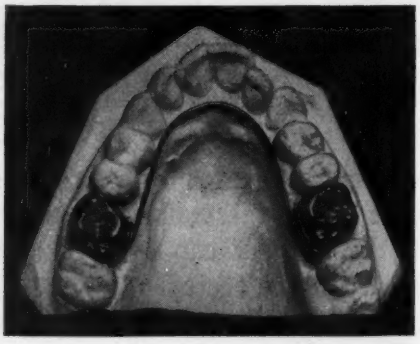

Fig. 8.—Shows the effect of the adjustment of the locking spring wires upon the rotation of the molars.

we may find the mesiobuccal cusp of the maxillary first molar may be lingually inclined, and the distolingual cusp in nearly its normal relation to the mandibular molar. Rotated molars of this class indicate that the mesiobuccal cusp be directed buccally, with the distolingual cusp used as a pivoting point. Another type of rotated molar is the one which requires the mesiobuccal cusp to be directed buccally and the distolingual cusp lingually, the whole tooth being rotated using the center of the crown as the axis of rotation.

Fig. 7 illustrates both of the types. On the reader's left is shown the

type of molar to be rotated, using the center of the crown as the verticle axis of rotation; while on the right is shown the type of rotated molar using the distolingual cusp as the center of rotation.

To rotate the molar on the left, the arch wire is bent so that the pin lies anterior to the tube about the distance of its own thickness and approximately the same distance lingually, while a buccal "kick" of about 1 mm. is put into the locking spring wire. This side is locked to place first. Fig. 8, left side, shows the effect of the adjustment on the molar.

To rotate the molar on the right, the tube is used as the center of rotation, and the pin and tube relation not disturbed, only a buccal "kick" of about 1 mm. being put into the locking spring wire, the pin lying in the tube passively. The molar on the right in Fig. 7 shows the effect of the adjustment.

It is better to make three or four adjustments in rotating the molars, than trying to get the required rotation in one adjustment, as less danger would be encountered pathologically. It is also advisable to rotate one molar at a time, thus making the passive end of the arch, stationary anchorage, by ligating to two or more teeth of that side.

If it is desired to tip molars buccally or lingually, a torsional strain is

Fig. 9.—A model to show the buccal and lingual use of the attachment. The buccal attachment is the same as shown on the lingual, but not distinctly shown.

Fig. 10.—Shows half of a model to demonstrate the rigidity of the lock. The arch wire has been removed to show the part of the lock more clearly.

put into the arch wire by giving it the desired twist, so that the pins lie in the position they are to take eventually, and then forced into the tubes, and locked.

Fig. 5 shows a practical case, with the locks and stabilizing arch in place, together with the lingual springs, which lie to the gingival of the stabilizing wire for protection. The cut also shows the relative space taken up by the locks.

Fig. 6 shows the stabilizing wire after removal, and the Mershon auxiliary springs used for lateral expansion, with the same principle applied to the anterior springs. These anterior springs are soldered to the stabilizing arch at the median line, extending distally to include the lateral incisors, and recurved to the median line. These springs give a range of movement at any point, and tend to prevent separation of the anterior teeth which is apt to result when a long lateral spring is used (with distal attachment). Care must be taken not to put too much pressure on these springs as they have a tendency to crawl up the lingual inclines of the incisors, unless pre-

vented by a spur on two or more bands, which otherwise would cause a tipping of the molar teeth. In distoclusion cases, with overbite, this has the same effect as using a labial arch which has been bent gingivally and sprung occlusally and ligated to the anterior teeth.

Fig. 9 is a case showing the use of the No. 2 lock in connection with the molar stabilizing arch, and also showing its use bucally in connection with a high labial arch, although the plain round tube or the Barnes' tube may be more practical to use here.

Fig. 10 is a clinic model to demonstrate the rigidity of the lock, but in the figure the arch wire is removed to show the construction of the lock. In this

Fig. 11.—Shows a modeling compound impression of Fig. 5, after the lingual arch was removed, with duplicate round tubes in the impression made by those on the model. The hook shape wires are soldered to the tubes to hold them to the plaster after pouring.

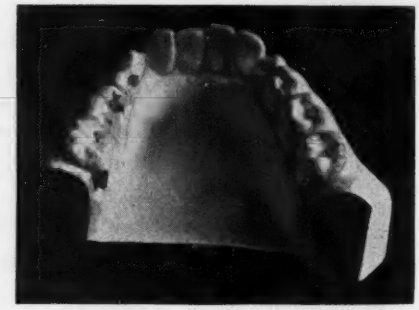

Fig. 12.—A model showing the position of the tubes after pouring the impression shown in Fig. 11. This gives a working model upon which is made the new appliance without removing the bands from the teeth.

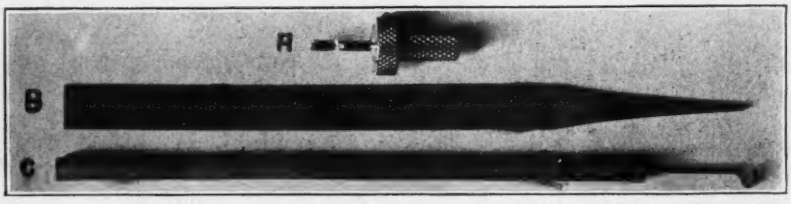

Fig. 13.—Shows the file, solder trimmer, and steel wire used in making the locks.

case the pin was soldered to the arch wire instead of bending the end of the arch wire to form the pin. The bending of the stabilizing (arch) wire to form the pins, makes one less soldered joint and consequently strengthens the stabilizing wire.

MAKING A NEW ARCH WIRE

To make a new arch wire without removing the bands from the teeth it is desired to have only the correct relation of the tubes and the lingual surfaces of the teeth, but not necessarily the bands. This method is not new, but quite convenient in this case. A plaster or compound impression is taken of the

teeth, etc., with the appliances removed. This leaves the impression of the tubes, teeth, etc., in the impression material. Like tubes, to which German silver wire extensions have been soldered (Fig. 11), are placed in the impressions made by the tube on the bands, and waxed to place. When the impression is poured these wire extensions being anchored in the plaster hold these tubes rigidly in place (Fig. 12). From this point on the new arch is made as before.

To shorten the operation of making a new lingual arch wire, the old wire is cut off at both ends about ¾″ from the pins, and the pins placed into the tubes of the model (Fig. 12), and the new portion of the arch adapted and formed where desired, soldering the ends of the old arch and the new with 22 karat solder. This operation gives a new arch wire with the minimum of time and materials, the locking portions not being disturbed.

Fig. 13, *A*, shows a solder trimmer used to remove the excess solder from the joints where the pins are soldered to the arch wire, but is not needed when the pins are formed by the continuation of the arch wire. *B* is a jeweler's file used because of the fine cut and definite square edge for making the "catch." *C* is a steel wire which has been driven into the end of an orange-wood stick, and heated and bent as shown. This is used to hold the tubes while soldering them to the bands, as solder sticks to steel with difficulty. Steel's antiflux may help in this detail also.

THE PRINCIPLES OF THE JACKSON SYSTEM OF ORTHODONTIA*

By Dr. V. H. Jackson, New York City

Showing:

1. The divisions of the dental arch as he describes them, are defined by the sutures of the maxillæ.

2. The plan of the regulating appliances recommended, consists of a rather large base-wire as the foundation of the appliance, there being three standardized forms. Other parts of the appliance are as follows:

3. Partial-clasps, wire-clasps and spring-clasps of suitable form to anchor regulating appliances to the teeth used for anchorage.

4. Finger-springs of various forms on appliances, for moving the teeth.

5. Semicircular-springs, labial and lingual, with loops for moving incisors and canines.

6. Spurs as used, extending onto the crown of the anchorage teeth, for supporting the appliance to prevent it from resting on the gum.

7. Lugs on collars cemented to anchorage teeth to support the free end of clasps used for anchoring a regulating appliance in moving the teeth.

8. The plan of a "locking device" having wire-clasps extending from the appliance with the free end held by a lug on a collar cemented to the anchorage teeth.

9. Metals recommended for making appliances. Precious metals for all parts, as collars, base-wires, springs and partial clasps. Silver nickel for base-wires and springs. German silver for base-wires. Phospho-bronze for base-wires and especially for springs. Spring-bronze plate for partial-clasps, etc.

10. *Equalizing* the dental arches with equalizing bands in cases of posterior-occlusion, anterior-occlusion and unilateral occlusion with equalizing posts.

11. *Working Model,* showing what changes take place in the mandible in equalizing the dental arches in cases of posterior-occlusion, prognathism, excessive overbite, lack of anterior-occlusion, etc.

12. *Record Card* for keeping permanent record of changes in regulating appliances for adding force in moving the teeth. In effect reducing orthodontia to an exact science.

13. *Standardizing* regulating appliances used for different purposes in moving the teeth.

*Read before the American Society of Orthodontists, Atlantic City, N. J., April 27, 1921.

DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

A PRACTICAL METHOD OF WIRING FRACTURES OF THE MANDIBLE OR MAXILLA*

By James Walter Ford, D.D.S., St. Louis, Mo.

At a recent medical society meeting a statement was made that the method of treating fractures of the mandible or maxilla by wiring is unsatisfactory. Evidently the doctor was speaking from his own experience along that line which surely must not have been very extensive. It is a fact that there are some fractures of the edentulous mandible or maxilla which cannot be treated by wiring, as the term is herein used; yet in the majority of other cases it is the most efficient method of treatment.

Wiring is the ideal method of treating fractures of the mandible or maxilla in the hands of the operator who has a thorough knowledge of normal and abnormal occlusion. It is a serious mistake for a dentist or a physician to treat fractures of the mandible or maxilla by any method if he knows little or nothing about occlusion.

There are several methods of treating fractures of the jaws, the least desirable of which is the use of the bandage. A bandage is tight when placed in position but soon loosens, thereby failing to hold the fractured parts in their proper positions for any considerable length of time. Fixation in proper relation is the objective in fracture treatment, and it is plainly evident that fixation is not secured by the use of any sort of bandage. If the convenience of the patient is to be given any consideration the bandage method is contraindicated. A loosely applied bandage, however, is used as an adjunct merely to indicate that the patient is under treatment for some condition about the head. One may readily understand that in a ward, a quarrelsome patient without such marking might get his mandible "busted," still more extensively.

The dental splint if properly made holds the fragments in their proper positions. Ready-made dental splints of any type are of little real value.

*Read before the St. Louis Society of Dental Science, September meeting, 1922.

Time and prosthetic skill are required to make an individual dental splint for each fracture case that presents itself, so the parts cannot be brought into normal positions and to rest immediately. It is desirable to obtain fixation of the parts in their normal positions as soon as possible after the fracture occurs; however many cases present themselves after the fracture has been neglected for a week or more. Infection is usually present in such cases, which condition slightly complicates the procedure.

It is evident that the first consideration in all fracture work is a digital examination followed by an intelligent radiographic examination, usually using x-ray plates. Another radiographic record is made after an attempt has been made to put the parts into their normal positions, to make certain that the attempt was successful.

The method of wiring fractures of the jaws described in this paper, which I believe is an improvement over former methods, is original so far as I know. It is merely the result of my being placed in a position where equipment was limited and where something constructive had to be done for dental fracture cases as they presented themselves.

Three kinds of wire are used—German silver, or Liberty metal, wire 17-

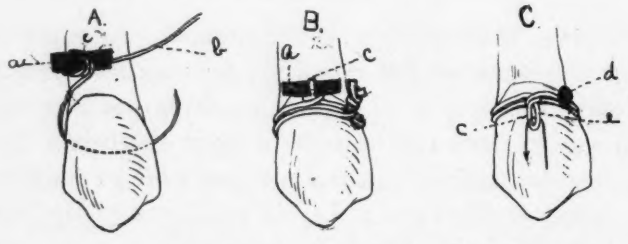

Fig. 1-A.—Showing the 24-gauge iron wires put through the interproximal spaces with one bent for the return passage through the other interproximal space. (*a*) German silver 17-gauge wire. (*b*) 24-gauge iron wide. (*c*) Eyelet in 24-gauge iron wire.

B.—The iron eyelet anchor wire is adapted to the neck of the tooth with the ends twisted.

C.—The anchor wire in position with eyelet "e" bent occlusally or incisally to receive the connecting wire. Seventeen-gauge wire has been removed from eyelet. (*d*) Knob of cement covering end of twisted wires.

gauge cut into pieces one-half inch in length; iron wire 24-gauge cut in pieces four inches long; and brass wire 24-gauge cut in two inch lengths. One of the short bits of 17-gauge wire is used to form an eyelet in the iron wire by bending the iron wire at the middle of its length upon the short wire. The long ends are crossed as closely as possible to the 17-gauge wire with these ends extending in opposite directions. With a pair of flat-nosed pliers the two iron wires are firmly grasped where they cross and close to the 17-gauge wire which is held in a vertical position with the left hand. The pair of pliers is given three-fourths of a complete turn either to the right or to the left, being guided by the uppermost wire. If the upper wire extends to the right, turn toward the right. If the upper wire extends toward the left, turn the pliers in that direction. When this movement has been completed, the opening at the point of the partially closed pliers is in a plane parallel with the length of the 17-gauge wire.

A number of these wires may be made up at one time. Very little time is consumed in making them. The ends are of sufficient length to be applied

to any tooth that may be selected as an anchorage. The short German-silver 17-gauge wire is left in each eyelet until the iron wire has been completely adapted to the neck of the tooth and secured in proper position.

After a thorough study of the fracture or fractures from the radiographs and a complete examination of the occluding and incising surfaces and angles of the teeth, a decision is made as to the teeth upon which the wires should be placed. Different classes of malocclusion require a force or forces working from different directions. Therefore it is difficult to lay down a procedure for attaching the wires in a given number of cases of the same type of fracture, as the classes of malocclusion may have as many variations as there are cases, up to a considerable number.

It has been found that in a fair percentage of cases it is possible to attach the eyelet anchor wires to the premolars, i.e., one eyelet anchor wire on one of the premolars of the right maxilla and another eyelet wire on one of the premolars of the right mandible. On the left side the eyelet anchor wire

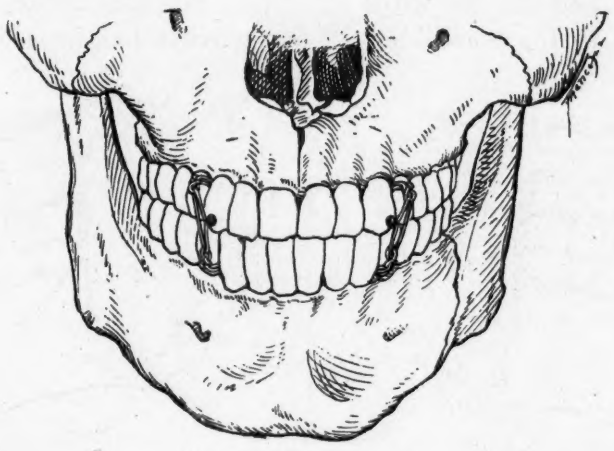

Fig. 2.—A complete appliance in position for treating a mandible fractured posterior to the mandibular third molar.

may be attached to one mandibular premolar* and a maxillary premolar, using in some cases the same teeth as on the opposite side. The canines must be used in some cases in which the premolars are missing or are crowned. In other mouths, the eyelet anchor wires are carried by the molars and occasionally by the central incisors. In some fractures it is necessary to use more than two eyelet anchor wires on each side. It is obvious that more anchorage is required to hold the jaws of some of the tobacco grinders in a desired position than to produce the same effect in the mouth of a delicate young lady who has not acquired the gum chewing habit.

After determining which teeth shall carry eyelet anchor wires, the next step is the final preparation of the wires before putting them in place. For this purpose, the cylindrical handle of a hand instrument is used. For some teeth, a mouth mirror handle is used to advantage. In other cases the round-nosed pliers is the proper instrument. The diameter of the handle used must

*The terms premolar and canine are used instead of bicuspid and cuspid to comply with the requirement of the journal. The author uses the terms bicuspid and cuspid.

be the same as the mesio-distal diameter of the tooth which is to receive the wire, measuring through the middle third or the buccal or labial surface of the tooth. The two free ends of the iron eyelet anchor wire are held between finger and thumb of the left hand with the eyelet end farthest from the body. Then the instrument or mirror handle or even the round-nosed pliers is placed between these wires and moved toward the eyelet, exerting considerable pressure when the twist in the wires is reached so that this portion of the wire will be more readily adapted to the neck of the tooth. Each wire is treated as above. Then each of the wires should be in the shape of a long wire staple such as wiremen use to fasten lines of wire to wooden supports. The two lengths should be parallel and the same distance apart as the mesio-distal diameter of the middle third of the buccal or labial surface of the tooth to be wired.

In placing the eyelet anchor wires on the teeth it is well to always have consideration for the patient. If there is a fracture of the mandible, use good judgment and put the wires into place carefully on the maxilla before applying them to the mandible. If the maxilla has been fractured apply

Fig. 3.—Lateral view of Fig. 2.

Fig. 4.—Lateral view of opposite side from the fracture. Dotted line represents ligature holding eyelet anchor wires in position while connecting wire is being applied.

all wires to the mandible first and to the opposite side of the maxilla before working in the region of the fracture. If this order is followed, the patient suffers less and will tolerate considerable pain if there is any, while the operator is placing the wires in the region of the fracture or fractures.

Each eyelet anchor wire is placed in position in the following manner: One of the ends is placed upon the gingival line of the crown of the tooth where it joins the mesio-buccal or mesio-labial line angle. The other end is placed upon the gingival line of the crown of the same tooth where it joins the disto-buccal or disto-labial line angle. By holding the anchor wire by the German-silver wire and exerting pressure thereupon while the other hand guides the two points, the eyelet wire is gently forced into its proper position, without the use of instruments or pliers. This German-silver wire should extend at right angles to the long axis of the tooth being wired if the technic is followed correctly. Now the ends of the iron wire are crossed but not twisted on the lingual surface of the tooth and the wire which passed

through the mesial interproximal space is passed back toward the buccal or labial through the distal interproximal space. The wire which was passed to the lingual through the distal interproximal space is returned to the buccal or labial through the mesial interproximal space. One wire is passed through at a time. If the 17-gauge wire in the eyelet is held firmly while the return passages of the two wires are being brought about with pliers, the patient will suffer little inconvenience. Then two pairs of pliers and a beaver-tail burnisher are used to adapt this iron wire to the neck of the tooth. The eyelet with the 17-gauge wire should be directly over the center of the area designated as the gingival third of the buccal or labial surface of the tooth being wired.

The ends of the wire are drawn taut and crossed on the buccal or labial surface, occlusally or incisally from the eyelet and generally toward the distal. The wires are firmly grasped with a pair of flat-nosed pliers and the ends twisted gingivally and distally. This twist when completed should be

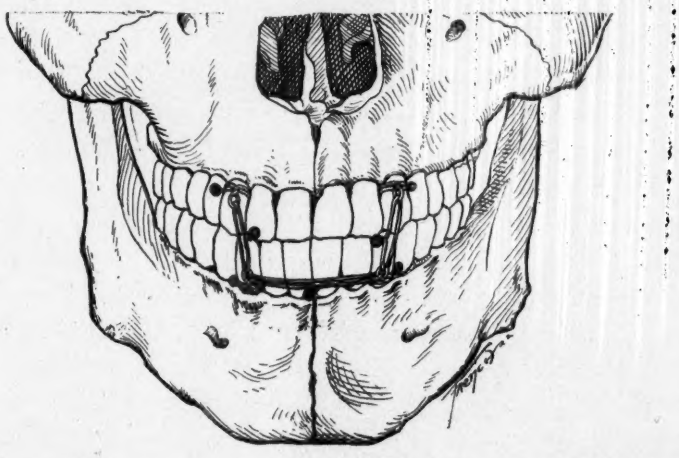

Fig. 5.—The wiring in position to treat a fracture of the mandible through the region of the symphysis.

cut off leaving it about one-fourth of an inch in length. With an amalgam plugger, the end of the twist remaining is bent distally and gingivally and covered with a small knob of quick setting crown and bridge cement to prevent irritating the buccal or labial mucosa and to enable the patient to keep the area clean.

The reader will understand from this article that in the first step both ends of the wire are passed through the interproximal spaces simultaneously; i.e., one end through the interproximal space distal to the tooth to be wired at the same time that the other end is being put through the interproximal space mesial to the tooth to be wired. In the second step, the wires are crossed, not twisted, and one wire at a time returned to the buccal or labial through the interproximal space on the opposite side of the tooth from which each was passed lingually.

The eyelet is bent toward the incisal or occlusal surface of the tooth supporting the wire and the 17-gauge wire is removed. The eyelet remains in the same position relative to the plane which is parallel with the long

axis of the tooth from the buccal or labial to the lingual or when the first step in placing the wire was completed. If the technic has been followed carefully the eyelet anchor wire should be securely attached to the tooth.

After having placed the necessary number of anchor wires, the next consideration is connecting these eyelets. Dental ligature or floss is used to connect the anchor wires temporarily while the brass wires are being put into place. This ligature prevents any pressure against the gingiva.

A right angle bend is made in the 24-gauge brass wire about a third of the distance from one end. The long end is passed through the upper eyelet and then through the lower one. These ends are twisted as the operator watches the line of occlusion. Many times two lengths of the 24-gauge brass wire are required to properly connect two eyelets. Care should be exercised that these connecting wires are tight, yet not too tight. It is well to see the patient again after a few hours to see that the appliance is properly adjusted. Many times it is necessary to tighten the connecting wires after the first twenty-four hours, but these are the only wires which should need tightening. Should one of the connecting wires be twisted until it breaks, connect the eyelets with a ligature and replace the broken wire.

The twisted ends of the connecting wires are covered with a small amount of C & B quick setting cement making a knob-shaped mass. Then the ligatures are removed from the eyelets.

Each patient should be provided with a small mirror and a pair of small shears. Each patient should be shown the connecting wires and instructed how to clip them in the event of an attack of emesia. The nurse should be present when the instructions are given to the patient, if a hospital case. Several members of the family should know about the appliance if the patient is not a hospital case. Accidents do happen and generally with fatal results if none of those about knows the case.

Feeding the patient with a fractured jaw wired is not such a serious problem as might first be surmised. Hand the patient a glass of water and have him drink it. If the patient can get water into the mouth one is pretty safe in believing that there are many nourishing foods of which the patient may partake, such as: milk, soups, soft-boiled eggs, fruit juices, liquids from cooked vegetables, and in fact most liquid and semisolid forms of food.

A tooth or teeth should not be extracted to facilitate the feeding of the patient. It is very seldom that such a procedure is ever justifiable.

After the passage of from four to six weeks, depending upon the presence or absence of infection at the time the wires are put into position the connecting wires only should be removed. Other wires should be attached over the occlusal surface of each tooth supporting an eyelet away from the gingiva. The jaws may be freely opened if no ankylosis is present.

In case of ankylosis have the patient exert pressure upon the mandible and maxilla several times daily with the thumb and finger, tending to gently force the jaws farther apart. Sometimes a small wooden wedge of some soft wood is given the patient to gently force between the mandible and maxilla several times daily allowing it to remain in position for several minutes at a time.

The patient should be advised to avoid all solid foods for several weeks after the connecting wires have been removed.

The eyelet anchor wires are removed about five days after the removal of the connecting wires.

The advantages of this method over former methods of wiring fractures of the mandible or maxilla are evident to those who have had experience in treating fractures. The wires are less irritating than wires put on by other methods and very much less irritating than so-called fracture bands. If the eyelet anchor wires are made carefully with pliers having smooth working surfaces instead of the serrated ones there is absolutely no reason for the eyelet anchor wires breaking. The only wires which may need tightening after the wires have been placed are the connecting wires. So these connecting wires may be twisted too much and break. However they are readily replaced as has been explained in another paragraph. When other methods are used it is necessary in most cases to replace all mandibular and maxillary attachments on one side if one wire is broken. When the eyelet anchor wires are properly placed, the direction in which the forces are working may be more accurately controlled than by any other method which I have used or have seen used in treating fractures of the mandible or maxilla.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Edited By

Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

PROBLEMS OF DENTAL RADIOGRAPHY*

By Dr. A. R. Ebenreiter, Los Angeles, California

THERE is nothing in dentistry about which there is so great divergence of opinion as there is in the production of radiograms. Radiograms that some dentists deem good, others will criticize so severely that the radiographer is often at a loss as to what to do. The prospects for a dentist who

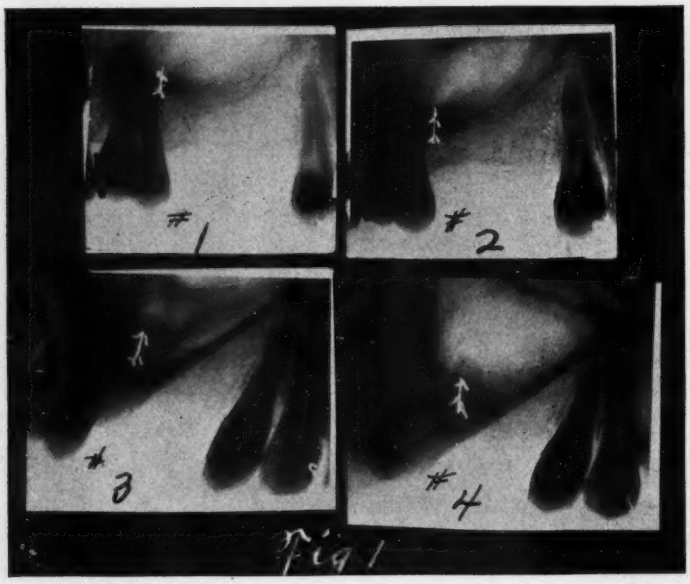

Fig. 1.—Demonstrating the necessity of radiograms from different angles. Patient suffered from continual headache, dizziness and fullness on left side of face, antrum involvement suspected. An operation on the antrum was performed, the root fragment removed, the antrum treated for several days, the above symptoms finally disappeared entirely. No. 1 shows a slight abnormal radiolucency in the antrum, but not sufficient evidence for a radical operation. No. 2 shows this radiolucency more clearly. No. 3 shows evidence of root fragment in the antrum. No. 4 shows the root fragment plainly, also the pathology around it.

has been actively engaged in his profession for many years and who wishes to specialize in radiography are not very promising.

Some years ago, and not so many at that, when x-ray phenomena were

*Read before The American Society of Dental Radiographers at Los Angeles, Cal., July 19, 1922.

first discovered, and when it had been demonstrated that radiograms of the teeth could be produced, the dentists everywhere were agog. They thought that their troubles in making a diagnosis were largely at an end. But when they found that a radiogram was not a photograph, and did not necessarily picture the condition as it really existed, it came into disrepute by some of the dentists who were ever ready to voice their opinions in this respect. Finally the laity became suspicious and a great many of them came to the conclusion that the x-ray was but a medium for getting a little more money from the patient and I am sorry to say that this impression was helped along by some of the unscrupulous of the profession. Finally when the radiogram came into its own, numbers of dentists began to impress upon their patients the necessity of the radiogram as a means of a more accurate diagnosis. The result was that there was a call for some one to take up this line of work, and before it was realized what had happened, individuals who had

Fig. 2.—This radiogram shows root fragment of upper molar, also the coronoid process of the ramus. This process is sometimes mistaken for root or finger holding the film.

Fig. 3.—Extensive destruction of alveolar process around the molar, mesial and distal buccal roots being completely denuded of all tissues.

Fig. 4.—An impacted upper third molar, slight absorption of the apices and an apical pericementitis, also calcific deposit in the pulp of the second molar.

Fig. 5.—A fragment of a hypodermic needle apparently near tooth. This radiogram was taken to check up canal filling.

more training in the fundamentals of commercialism than the professional men, saw the future possibilities of conducting laboratories for financial gain and social prestige. With the encouragement given these persons by representatives of the different manufacturers of x-ray machines, this branch of dentistry soon fell into the hands of those who were no more qualified to do this work than persons who had not the necessary education and training to perform any other operation in the field of dentistry or medicine. I say this because I feel that radiography is one of the most important branches of dentistry today which, in many instances, is in the hands of persons not

qualified for this work. The result is that the public suffered and consequently the dental profession also. We have gone at this work in the wrong light. Before we went into the production of the radiogram or improved ourselves in the knowledge of normal and abnormal conditions to know when we had a good radiogram or a poor one, we disregarded all that and took for granted that we knew enough about reading radiograms to make an excellent interpretation and thus put the cart before the horse.

The radiogram has been of great service to the dentist. It has enabled him to see what kind of a root canal filling he had put in or what kind of a gingival margin he had in making restorations and many other things which I will not enumerate at this time. In all it has improved dental technic and

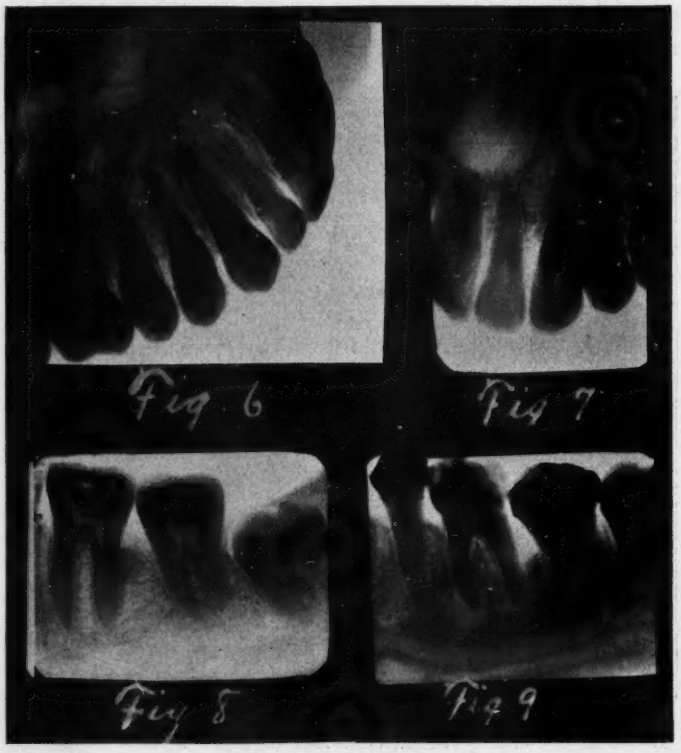

Fig. 6.—Fractured root of the upper lateral incisor, also break in the continuity of the alveolar process. Patient was hit by an automobile.

Fig. 7.—A radiogram showing a well defined cyst. The central and lateral incisors were tested for vitality, and it was found that both pulps were dead. These teeth were extracted and a cyst the size of a small hazel nut removed.

Fig. 8.—The mesial horn of the pulp in the first molar near the occlusal surface, a possibility which should always be considered in cavity preparation. The small radiolucent area on the distal may be subgingival caries.

Fig. 9.—A badly broken down lower first molar with extensive destruction of the alveolar process on the distal, and great apical involvement. The inferior dental canal can plainly be seen in the radiogram.

has generally elevated the standard of the dental profession. Any person who interprets or tries to interpret a radiogram, should know what constitutes a good radiogram. The ability to do this requires a thorough knowledge of the normal in order that everything in the existing condition may be perceived as far as it is possible for radiography to show these conditions. A careful study of a great many radiograms is necessary to be able by means

of the radiolucency and radiopacity seen in the radiograms to recognize them as normal or abnormal. The fault of a great many men is that they are satisfied with one radiogram of any area. For good reasons, some areas should be radiographed from two or three different angles; multiple rooted teeth, teeth where there are anatomical interferences, such as upper molars, should be radiographed at least from two and most of the time from three different

Fig. 10.—In radiogram No. 1 the mental foramen can be seen at the apex of the second premolar, a vital tooth. In No. 2 the mental foramen falls between the premolars. The unbroken peridental lamella is evident in both cases.

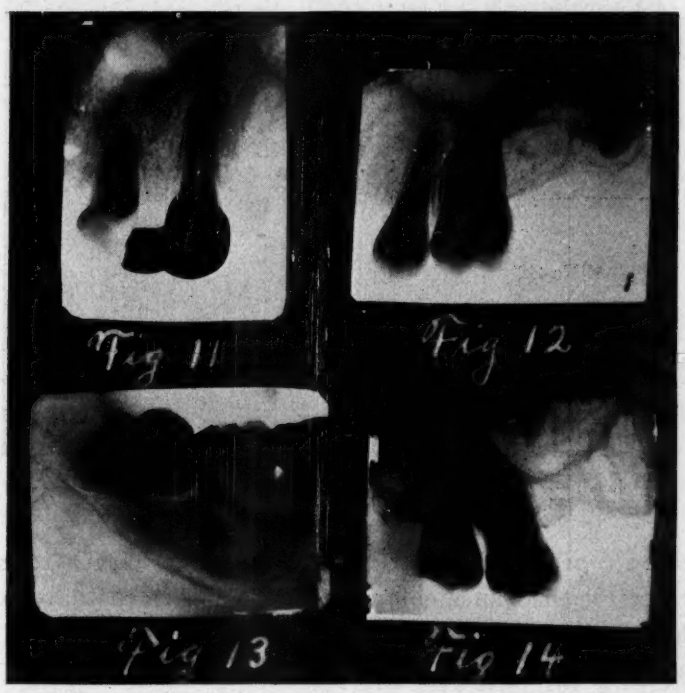

Fig. 11.—An elongation of the incisor root might have resulted in the anterior palatine canal appearing at the apex and being mistaken for a pathological radiolucent area.

Fig. 12.—This radiogram shows an unerupted upper third molar in patient 15 years of age. The gum line and thickening of the peridental membrane and peridental lamella can plainly be seen.

Fig. 13.—Impacted lower third molar with alveolar absorption under crown and a pericementitis around the roots.

Fig. 14.—Radiogram showing a root fragment in the antrum. The floor of the antrum and the radiolucent areas at the site of the second premolar and first molar can be traced.

positions. Lower molars and upper bicuspids require two exposures from different angles. In radiograms for single rooted teeth one exposure can suffice as in those films abnormal conditions can be more easily observed.

In a complete case, I believe that twenty radiograms should be made to be of value in making a diagnosis. This gives one from two to three different views of each tooth and helps in that it avoids taking a normal radiolucency or radiopacity for an abnormal one. Edentulous areas should be given the same consideration as if all teeth were present.

The radiographer should at all times conduct his laboratory along professional lines, give no information to the patient, and make interpretations to the dentist only when so requested by him. Be ever ready to assist those who desire it to the best of his ability. The radiographer should be thoroughly familiar with the form of energy employed and also his apparatus, so that the highest point of efficiency may be obtained. He should have a knowledge of the dangers of x-radiation to the patient and to himself, always remembering that serious conditions may be the result of his carelessness. The x-ray machine is not fool proof, contrary to the assertions made by the

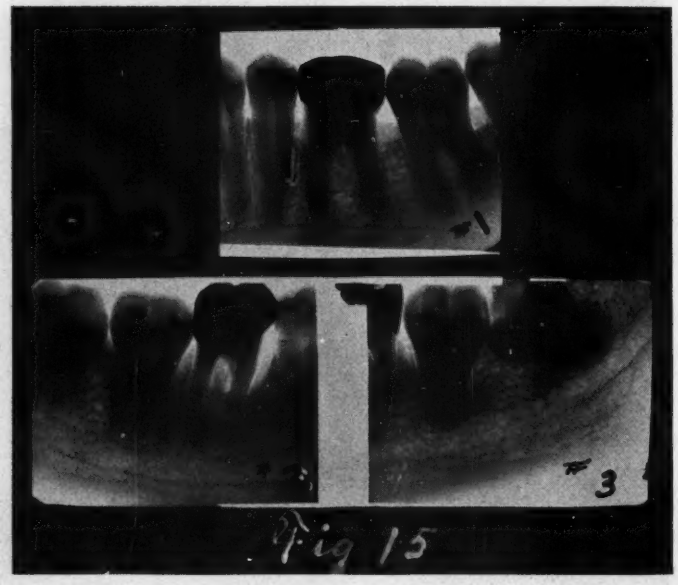

Fig. 15.—Radiograms showing differences in cancellations of the alveolar process of the white and negro race. No. 1 is of a white patient. Nos. 2 and 3 of a negro.

different factory representatives. In a conversation with a representative of a popular protective insurance company, I was informed that the directors of this and other insurance companies have under consideration at the present time the eliminating of the protective policy for radiographers for the reason that out of the many damage suits brought against operators, the companies have lost every case, mainly for the reason that when the experts of the different manufacturers were called upon the witness stand they testified that there was an element of danger in operating the machine and only the greatest care and caution upon the part of the operator would help avoid these dangers.

The technic for producing good radiograms can only be standardized to a certain extent. Those factors are milliamperage, penetration and distance from target to film. The spark-gap varies on successive days, due to atmos-

pheric conditions. Tube pointing is impossible to explain on paper. In my opinion, time is the most important factor and it is governed by different conditions, most of all the patient. Age, sex and physique have to be taken into consideration at all times. In conducting a laboratory, one should have a machine of sufficient power and a tube of sufficient capacity for the maximum amount of work required of it. I use a Universal Coolidge tube with a fine focal spot. I find that I get the best results by using 20 milliamperes spark-gap 4¼ inches and a distance of about 19 inches from target to film. The dark room and dark room technic are important factors in producing good radiograms. I regret to say that this end of the work has been greatly neglected by some operators. The dark room factors are a positively dark room, pure water and chemicals. I do tank developing, keep my developing and hardening solutions at a temperature of about 67° F., develop films for four minutes, duplicates five minutes. I use the green light as I find it less hard on the eyes than a ruby light. Last, but not least, is cleanliness, that means cleanliness in every detail. *Avoid all dirt and dust. Keep solutions well covered when not in use. Keep fan clean from excessive oil, and most of all keep hands clean and free from moisture.*

In placing films in the mouths of patients, always have the head of the patient in such a position that the occlusal surfaces of the teeth to be radiographed are on a horizontal plane, placing the film so that the upper or the lower border, as the case may be, is on a line with the occlusal surfaces of the teeth. This will avoid having the teeth radiographed appear crosswise on the film.

In conclusion, I will summarize the points I wish to bring out most clearly in this paper.

1. The radiographer should be a licensed dentist or the work should be done under his personal supervision.

2. Dentists should know a good radiogram from a poor one and demand the best from the radiographer.

3. The radiographer should master a technic that will produce the best results.

4. There should be a hearty cooperation between the dentist and the radiographer at all times.

5. The radiographer should assist in every way possible to raise or uphold the standards of the dental profession.

6. That it requires more than one exposure for nearly all areas and that not less than twenty good radiograms are necessary for a complete set.

7. That radiograms are necessary in beginning dental work and the dentist should check up his work radiographically when it is completed.

8. Teeth with recent canal filling should be checked up radiographically at regular intervals.

RADIODONTIC RIDDLES

Conducted by Clarence O. Simpson, M.D., D.D.S.

A Department Devoted to Discussion of the Scientific, Technical, and Ethical Problems of Radiodontia

Notice Noses in Diagnosis

Q. What caused the root of the left central to appear fractured in these x-ray pictures, when it was not? In this case the incisal third of the right central was fractured and the left central loosened in an accident. After making two pictures I was so sure the root was fractured that I extracted it, but found it was not. When I do this to a sixteen year old boy it is time I was learning something about radiography or quitting it.

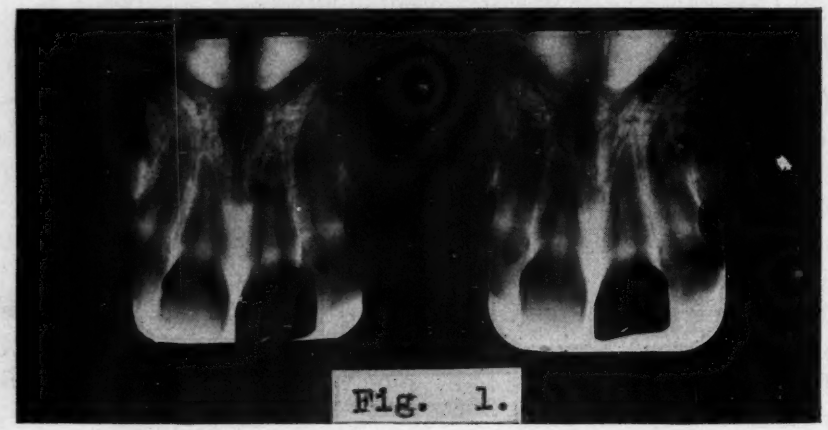

Fig. 1.

A. Yes, it is advisable to learn something about radiography before practicing it on your patients. You are to be commended for admitting the blame, instead of taking the usual course of saying the x-ray lied.

In this case the lower border of the nose is projected across the incisors producing a line quite similar in appearance to an oblique fracture. The change in location of the line in the two views should have warned you of a misinterpretation, if you had not observed the distinct outline of the nose. Doubtless the clinical evidence so strongly indicated a fracture, that slight corroboration was required to convince you. The most inexcusable mistakes in diagnosis and other conclusions are made by blindly following one theory to the exclusion of other possibilities. A diagnostician should approach his problems like a scientific detective, obtaining all available evidence and without prejudice, analyzing it for a cerrect deduction. A tentative diagnosis may serve as a basis for examination, but several theories are better than one, and guard against a single-track mind by being alert for pertinent developments.

In determining conditions in the maxillary incisor region at least three views are usually required to exclude the superimposed structures. One view parallel with the median line and a lateral view from each side at about 20 degrees from the median line. In the median line view the nose is usually superimposed over the apical half of the roots with the "u" or "v" form of the lower border falling diagonally across the teeth. In the lateral views the nose is projected in the opposite direction and unless it is very large will not obscure the teeth, but the anterior palatine foramen is often thrown near the apex of the central. The nose of the subject should be given equal attention by the radiodontist as by the portraitist. Not only must the angle of the rays be adapted to the form of the nose, but the exposure should be modified to the size. With every conceivable type of nose which is presented from the retroussé to the "moose," the radiodontist may study them advantageously in relation to his examinations. A deflected septum or a marked list of a nose to the port or starboard calls for skillful piloting to avoid the wreck in viewing the incisors.

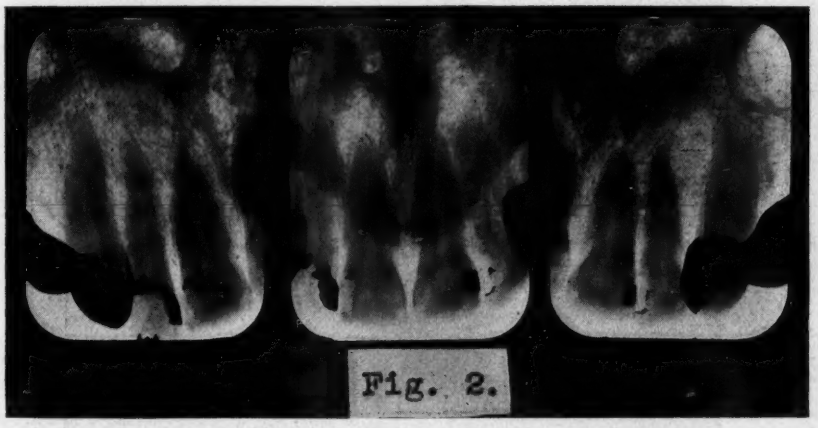

Fig. 2.—An illustration of shifting the nasal shadows in three views of the maxillary incisors.

Beside the outline of the nose there are several sources of confusing lines which may be misinterpreted for root fractures when the search is overzealous. (1) Marginal absorption particularly on the lingual surface of teeth produces a line of varying density which to an inexperienced observer would suggest a fractured root. (2) When the angle of the mouth is drawn upward and backward during exposure, the increased bulk of the contracted muscles causes a sharp line of demarcation diagonally across the maxillary canines. (3) A fracture of the alveolar process is often difficult to distinguish from a fractured root. (4) The wall of a cyst may be in such relation to the roots of teeth that it appears as a fracture. (5) Eccentric angles or the excessive bending of films which superimpose teeth may cause false conclusions including a diagnosis of fracture.

Even with these possible mistakes considered, some difficulty remains in determining the existence of fracture, and the fragments must be displaced sufficiently to show a space, or lack of continuity before the diagnosis is established. In recent fractures the fragments are usually held in apposition by

the investing tissues and displacement must be induced by suitably applied force. The proper application of the force depends upon the character and direction of the fracture. The wedging of the suspected tooth toward the mesial or distal is most likely to produce lateral displacement of the fragments, while pressure on the labial or traction on a ligature tied round the cervix tends to open a space between the fragments. In addition to manipulation of the exposed fragment, the choice of angle at which the rays are directed is equally important. To demonstrate the space between the fragments the vertico-horizontal angle should parallel the line of fracture, and several attempts at greatly divergent angles are often required to get the

Fig. 3.—Confusing lines from the alveolar margin.
Fig. 4.—Lines of demarcation caused by the alveolar margin and nasal shadows.
Figs. 5 and 6.—Irregular alveolar absorption which might be mistaken for root fractures.

desired result. In demonstrating lateral displacement of the fragments the mesio-distal angle should be shifted to the useful limits in an effort to disclose a decisive break in the continuity. The most difficult type of fracture to demonstrate radiographically is a mesio-distal break through the crown of a mandibular molar. The diagnosis can be made clinically, but the condition of the roots for restoration purposes can seldom be determined without removing the weaker fragment for examination.

A suggestive line of strong contrast in a radiogram is not sufficient evidence of fracture either in roots or the mandible. The "false-alarm" diagnosticians who remove harmless teeth under the pretense of eradicating

phantom infection may evade the consequences of their acts, but the removal of a perfect tooth on a mistaken diagnosis of fracture demands heroic pleas for absolution. Did the salesman who hypnotized you for the order tell you how to avoid such mistakes as this? No, he told you his machine was so simply perfect that a perfectly simple assistant could make the x-ray examinations, and he would teach her. You have plenty of "sucker" society, but dur-

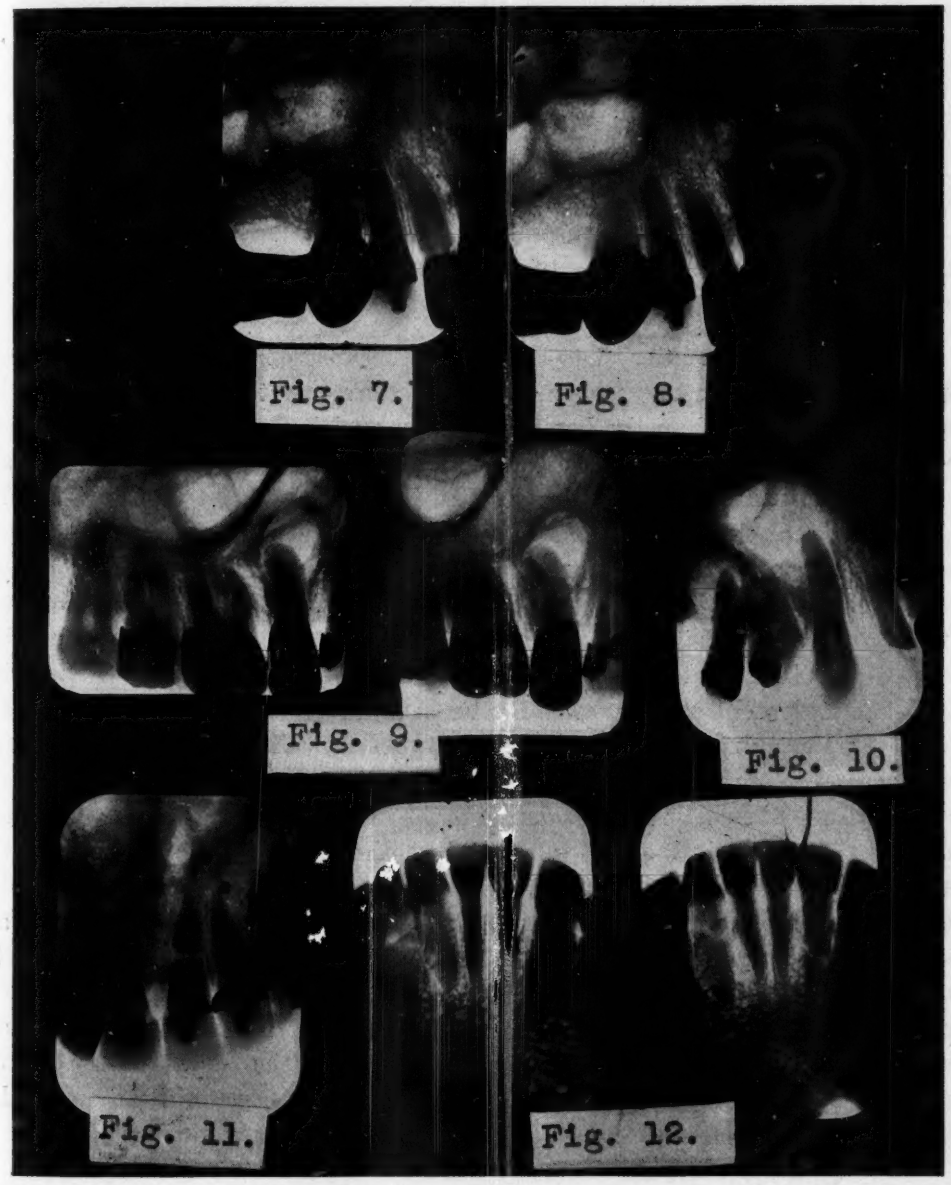

Fig. 7.—An illustration of the marked differences in radiopacity resulting from muscle contraction.
Fig. 8.—The same case showing the elimination of the line of demarcation by relaxing the muscles.
Figs. 9 and 10.—Outlines of cysts which might be taken for root fractures.
Fig. 11.—A space between root fragments as opened by traction on a ligature around the crown during exposure.
Fig. 12.—Lateral displacement of root fragment by wedging of the suspected tooth.

ing the future years of "bridging it" this patient may suspect that there is a difference between a "unitarian" and a diagnostician, and have decided views on "fool-proof" x-ray units, because he is wearing the proof.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Is the Human Organism an Electro-Chemical Mechanism? G. W. Crile (Cleveland). American Journal of Surgery, March, 1922, xxxvi, 3.

This article is of interest to the dentist because of the remarks on nitrous oxide-oxygen anesthesia. The author first shows that the liver is more important to survival than the brain, for after excision of the former the brain cells rapidly deteriorate. A decerebrate and even a decapitated animal survives if the liver is intact under transfusion and artificial respiration. The deterioration of the brain cells after extirpation of the liver is a specific phenomenon, for other organs remain for the time intact. In order to explain this singular relationship the author propounds his electro-chemical theory. The brain cells are batteries. As a matter of fact all the body cells are batteries. The brain cells are able to cause all other body cells to function. But of all body cells only those of the brain and liver show the phenomenon of sleep. If the animal is exhausted both types of cell show peculiar changes and these point to the need of sleep. The brain cells drive the body cells at large but are themselves dependent on the liver cells for the generation of energy. The practical aspect of this hypothesis has to do especially with shock, exhaustion and anesthesia. Ether at first increases brain conductivity which is later decreased, because the cells no longer receive oxygen and water as a result of isolation; and this behavior is due to the action of the anesthetic on the permeability of the cell membrane, which, originally increased is later decreased. Not less important than exclusion of oxygen and water is retention of katabolic products, within the cell. Under nitrous oxide-oxygen on the other hand the cell membrane permeability is much less increased and under full anesthesia practically remains unaltered.

In any kind of exhaustion, whether from traumatism or operation or insomnia or psychic causes or toxemia, the electric conductivity of the brain cells is decreased while that of the liver cells is increased. The liver is in fact the only organ of the body which exhibits this positive behavior. In the case of prolonged insomnia long rest periods are followed by return of conductivity to the norm. Adrenalin first increases and then diminishes brain conductivity. In certain bad surgical risk operations, as gallstones in the

common duct with jaundice, chills and fever, an abundance of water should be given before operation. Exhaustion, present or future, connotes accumulated waste products which require enough water to facilitate intracellular drainage. This is by no means due principally to simple retention for in these subjects metabolism is actually increased. Water should also be given after operation, by hypodermoclysis if the patient be unable to drink. Fear states which affect the acid-alkali balance of the cells and fever acidosis should when possible be eliminated. Nitrous oxide-oxygen should be used in place of ether with local nerve blocking. The type of operation rather than the individual patient determines whether an operative risk is technically bad, and as stated by way of illustration, gallstones in the common duct with the reaction above mentioned is a type of bad risk operation which requires resort to all preventive and postoperative resources.

A Contribution to the Etiology of Feeble-Mindedness, with Special Reference to Prenatal Enamel Defects. L. Pierce Clark and Chas. E. Atwood (New York). New York Medical Journal, May 17, 1922, cxv, 10.

The summary of the paper by two well-known neurologists is as follows: While there can be no doubt that defective enamelization of the teeth is the register of a gross teratological fault, we do not know whether this is a metabolic or a developmental defect in the broadest sense, or partly the result of a coexistent infection process in the mother or fetus at the time of the defective enamelization. Probably the strict accountability of infection as a cause of the fault cannot long be maintained, not only from our few data but upon general histopathologic grounds. Whichever, or both, of the forming causes is held, certainly the injury to a perfect enamelization is not coincidently registered in a neural tissue of the brain. Defective enamel in a questionable feeble-mindedness is therefore not of immediate diagnostic moment as far as the possible coincident injury to neural tissue is concerned. The metabolic and infectious cause of defective enamelization still remains obscure.

In conclusion the authors would like to urge for general discussion: 1. To what extent is feeble-mindedness exclusively hereditary? 2. If brain lesions are present in such a large majority of cases coming to autopsy, are such tissues of etiologic moment in the causation of the mental defect or are they but secondary to the symptomatic pathology of the gross picture of the disease? What are the gross teratological defects in feeble-mindedness which are of etiologic moment?

Explosion of Ethyl Chloride from a Glass Defect. K. Jalowicz (Berlin). Zahnaerztliche Rundschau, April 25, 1922, xxxi, 16.

This accident is one of the most rare encountered by the dentist. The author, who is connected with the School Dental Protective Clinic, has had this rare mishap befall him twice within a short time. On the first occasion he had barely opened the valve when with a dull explosion the flask gave way at its upper portion and the spray from the still half-filled bottle was scat-

tered in all directions. A boy who was in the chair ready for treatment received the full force of some of the chloride in the face and developed a violent bilateral conjunctivitis, which however had subsided notably three hours later. Fortunately no glass fragments had entered the eye. The quality of the anesthetic was not accused or the care in storing it, and there only remains the possibility of a defect in the glass, which view could not well be verified as the flask had been shivered. The second case of this accident is not mentioned and was doubtless a duplicate of the first.

Etiology and Pathogenesis of Cleft Tongue. Editorial, New York Medical Journal, March 15, 1922, cxv, 6.

It is self-evident that there can be no clear knowledge of this subject without a study of modern embryology. The tongue develops from an anterior and two posterior buds. The former appears as a median tubercle in the buccal floor in the meso-branchial space and gives rise to the base and tip of the tongue. The pharyngeal portion of the organ is formed by the persistence of two slight furrows, corresponding to the second pair of branchial clefts. These furrows develop into buds and the latter become covered eventually by the backward development of the anterior bud, separated by a V-shaped sulcus, the apex of the V being marked by the foramen cecum. Both cecum and sulcus are eventually effaced. In front the anterior bud rises and projects over the inferior maxilla, becoming the mobile anterior portion of the tongue.

Embryology explains a trifid tongue by noncoalescence of the three primary buds, but a bifid tongue is not so readily accounted for and several theories are available, the best being the external intervention of amniotic adhesions, which is the favorite explanation of atypical defects in general. With amniotic adhesions may be considered the rôle of embryonal neoplasms originating in the branchial clefts. The situation of the tongue is very favorable for either of these anomalous developments. In some of the reports of cases of cleft tongue embryonal tumors coexist while in others they are quite absent. The growth of the neoplasm readily interferes with normal development, here as elsewhere. In other cases cicatricial tissue points equally to amniotic adhesions. To seek an explanation of the adhesions and tumor formation some cases occur in hereditary syphilitics and the progeny of alcoholics, but such factors cannot explain all cases.

Dentofacial Maldevelopments and Their Correction. A. P. Rogers (Boston). Archives of Pediatrics, March, 1922, xxxix, 3.

These anomalies occur in the well-to-do and robust as well as in the poorly nourished children of the indigent. Nevertheless there is a connection between the most pronounced of these maldevelopments and deficient vitality, although they may be limited to the teeth and dental arches. They may be apparent before or at the time of the eruption of the teeth; or not until later, around the time of permanent dentition. The term hereditary is very mis-

leading and to assert it successfully it would be necessary to exclude environment; since slight changes in the food, temperature, moisture and other topical factors can influence development seriously. In civilized lands as a rule the diet does not give the jaws the growth stimulus seen in primitive peoples. In other words functional activity plays a notable rôle in development. The habit of thumb-sucking in the causation of "buck" teeth, etc., shows the sensitiveness of the rapidly developing organism to slight exogenous determinants. The maldevelopment here is extreme, the causal factor apparently insignificant. Maldevelopments may interfere with proper mastication, while speech defects are often coexistent and the general picture may be that of a marked degree of mental defect although the intellectual functions may be quite intact. In orthodontia as applied to these cases in addition to securing occlusion the muscles of mastication should have their activity stimulated with the aim of assisting the development of the dental arches, bearing in mind that if occlusion is imperfect the condition may be aggravated.

Report of Roentgenographic and Clinical Findings in the Teeth of 900 Patients. Matthew F. Eusterman (Mayo Clinic). The Journal of the National Dental Association, March, 1922, ix, 3.

All of the patients were referred to the Mayo Clinic within a period of three months, and the research was for the detection of possible foci of systemic infection, carried out as a matter of routine. Two thousand and ninety-nine pulpless teeth were found in these patients, an average of more than 2 per person. Twenty per cent only of these teeth were negative to the x-ray, giving 80 per cent with some sort of alteration. In 789 patients whose occlusions were determinable, 244 were normal or nearly normal. The remainder wore dentures and occlusion could not be considered. In 280 patients, or 31 per cent, the gums were apparently sound. There is thus a superposition of sound gums and normal occlusion which indicates that malocclusion favors pyorrhea. The number of teeth removed from the 900 patients was 2619, exclusive of 254 remaining roots, which represents about 7 per cent of the total number of teeth, counting 32 per person. The indication for removal was devitalization, caries or pyorrhea. But 45 separate areas required post-operative curettage.

Most of the pyorrhea was incipient, for only 5 per cent of cases presented osseous destruction, recession of gums and loose teeth. In 82 per cent there was suppurative gingivitis and in the remaining 13 per cent mild gingivitis Impacted teeth, mostly (60 per cent) lower third molars, were found in 13 per cent of patients, and more often in males than females. The health of this group was poor and hence they were suspected of focal infection. The prevalent diseases were of the stomach, gall bladder, appendix, kidneys, urinary bladder and joints.

The only link in the mind of the old time dentist between dental defects and the general health was imperfect mastication. Hence the physician was of no assistance to him in restoring a patient's good condition. Physicians

did not refer patients to dentists for the same reason, excepting of course for strictly dental activities. Today there is coöperation, or should be, all along the line. Recently the author reported a series of patients with dentures, 290 in number, in which the roentgenograms showed 129 remaining roots, 9 residual areas of infection, and 13 unerupted teeth; all of which were covered by the dentures, which had been in place on an average of eight years. Of these mouths 35 per cent harbored infections. If extraction of infected teeth fails to improve chronic arthritis, etc., this does not necessarily mean that the arthritis was not originally of dental origin, but rather points to the fact that long duration of the condition has made it excessively resistant to treatment of any kind; nor does the fact of recovery under a certain plan of treatment unconnected with the teeth justify drawing the same conclusion. In these cases all available resources should if necessary be combined.

Effects of Endocrine Derangement on the Dental Tissues. F. W. Broderick (Bournemouth, Eng.). New York Medical Journal, March 15, 1922, cxv, 6.

The search for constitutional factors in the origin of dental caries is comparatively recent. The author gives to Ewan Walker of Birmingham, credit for priority in this direction, when he suggested in 1910 that thyroid insufficiency might be a factor. In 1914 Mrs. Mellanby accused the fat-soluble vitamine, or rather its absence from the diet, as another factor. For a number of years past the present author has been emphasizing the importance of endocrine derangement in the etiology of caries. Granted that the exciting causes of the latter are those at present taught—carbohydrate stagnation, fermentation and solution of enamel through local organic acid formation, a correct endocrine balance is able to prevent this accident; and of the two causes the predisposition is the more important. The integrity of the enamel is the crucial factor and this organ is composed almost entirely of lime salts. The calcium of the body occurs fixed in the tissues as inorganic salts and free in the fluids as ionic salt. The fixed lime was originally free. The calcium ions are indispensable for the functioning of the neuromuscular structure. There is ordinarily plenty of lime in the diet, but the diet lime is not always utilized and even if absorbed may be eliminated by the kidneys without becoming ionic lime. In mere lime shortage, addition of diet lime may correct the conditions due to deficiency and even plenty of diet lime will sometimes correct the results of imperfect utilization or precocious elimination. But to this manner of making good there are very decided limitations. The calcium hunger of the growth period of life must be met with diet lime and in an absence of the latter, rickets and tetany are favored. Later in life it is the pregnant woman who develops lime hunger and suffers from lime deficiency. In old age lime is a liability. When there is plenty of diet lime, yet evidences are not wanting of lime shortage, some constitutional factor must be at fault and this factor is derangement of endocrine balance. The author has learned that ionic lime is deficient in children who are convalescing from measles and scarlet fever, by the simple method of measuring the quantity

of acid necessary to neutralize the alkaline saliva. This low calcium index was corrected by giving the children pluriglandular extract. Apparently with normal endocrine balance the child is able to store or retain calcium. Derangement means calcium waste or underassimilation or both. Experiments show that parathyroid, suprarenal and pituitary extracts with calcium lactate restore the normal alkalescences. Generally speaking low alkalinity favors caries while high alkalinity is compatible with pyorrhea.

Lack of space makes it impossible to follow the author through other particulars of endocrine derangement, but from his summary we learn that in all probability calcium shortage is one of the chief manifestations of disturbed endocrine balance and that the tendency of calcium deprivation is to set up one form of acidosis. The latter in its highest form involves not only ionic calcium but the fixed lime of teeth.

Early Diagnosis of Pyorrhea. T. P. Hinman (Atlanta). The Dental Cosmos, February, 1922, lxiv, 2.

In his paper entitled "Diagnosis of Gingival Lesions, etc.," the author has this to say of pyorrhea. The early diagnosis of the primary form is probably more neglected than anything in dental practice. Many patients neglect to consult the dentist for bleeding at the gums, or do not call his attention to the fact. The dentist therefore should invariably examine the gums of his patients and it is only necessary to compress the gums between the index fingers of both hands, one finger on the lingual and the other on the buccal side, the interdental portion of the gum receiving the pressure. In a majority of patients examined there will be some exudate, ranging from a slight mucoid flow to a profuse discharge of pus; and in quite a few instances there will be only objective evidences of any gingival disturbance.

In pictures taken of pyorrhea cases the condition of the surrounding bone is clearly shown and if the disease is of the infiltrative type the chances of successful treatment are extremely meagre. All have experienced disappointment in treating cases of this type, because after careful treatment the gingiva does not heal and the flow of pus soon returns; in fact it is seldom that it stops entirely. This condition is clearly shown in the x-ray picture.

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EDITORIALS

Newer Knowledge of Nutrition*

WHEN Dr. McCollum published the first edition of his work on nutrition it marked a new milestone in the study of diet in relation to general health.

The second edition is much larger than the first and takes up a general review of the research that has been done by other men on different foods.

Dr. McCollum's experiments as well as those by others seem to show that chemical analysis of food is not an accurate basis in regard to the nutrient value of foods. Some have a very similar chemical composition, yet produce different results from a biological standpoint. In fact, it might be said that the real knowledge of nutrition which begins with chemical investigations, must be further substantiated by animal experiments. The

*"Newer Knowledge of Nutrition," by C. V. McCollum, Professor of Chemical Hygiene, School of Hygiene and Public Health, Johns Hopkins University. Macmillan Company, New York.

feeding of different kinds of food to animals in laboratories has shown certain results which have later been substantiated by investigations along other lines.

Dr. McCollum also shows, as do other investigators whom he quotes, that a diet composed of a single food always results in faulty nutrition. Probably one of the most startling facts to the laymen is that certain foods which are supposed to have a highly nutritive value are insufficient to maintain a healthy individual. Of particular interest to the dental profession is that portion of the book dealing with dietary deficiency diseases, in which it is clearly shown that foods play a great part in the production and the cure of these conditions.

The chapter devoted to etiology of rickets is especially valuable to the orthodontist, as well as the chapter which deals with suitable food for the growing individual. To those interested in the question of nutrition, there is no book that will be so interesting to read as Dr. McCollum's second edition of the "Newer Knowledge of Nutrition."

Dr. McCollum's years of experimentation with diet especially fit him for the writing of this book.

ORTHODONTIC NEWS AND NOTES

The editors desire to make this department a permanent feature of the Journal, but in order to do so must have the full support of the orthodontic profession throughout the country. We would deem it a great favor if our subscribers and readers would send in such announcements as might be of interest to the profession.

American Academy of Applied Dental Science

The Fourth Annual Meeting of the American Academy of Applied Dental Science will be held at Miami, Florida, January 8, 9, 10, and 11, 1923.

All ethical students of progress in both the medical and dental professions are invited to take this short course in Orology-Health Dentistry. Papers, clinics and some educational classes free.

For information write Convention Headquarters American Academy Applied Dental Science, Congress Building, Miami, Florida, or Chamber of Congress, Miami, Florida. Dr. H. L. Madison, Cor. Sec., Burlington, Ia.

Notes of Interest

Dr. S. B. Hoskin announces the opening of his office at Morgan Building, Portland, Oregon, for exclusive practice of orthodontia and dental radiography.

Dr. M. J. Lentz announces the removal of his office from 1019 Broad Street, Newark, N. J., to 305 Clifton Ave., Clifton, N. J.

Mrs. James McCausland announces the marriage of her daughter Pearl Isabelle to Dr. William A. Murray on Tuesday, September 12th, 1922, in Chicago, Illinois.